



United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Kentucky Natural
Resources and
Environmental Protection
Cabinet and Kentucky
Agricultural Experiment
Station

Soil Survey of Hart County, Kentucky



How To Use This Soil Survey

General Soil Map

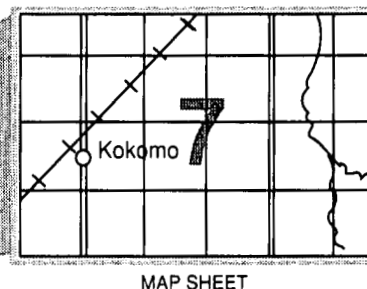
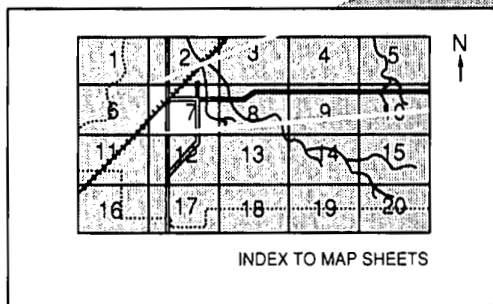
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

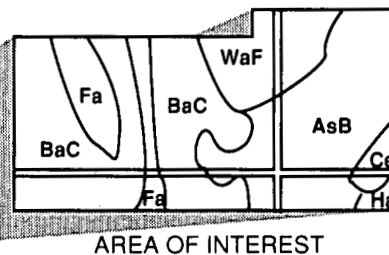
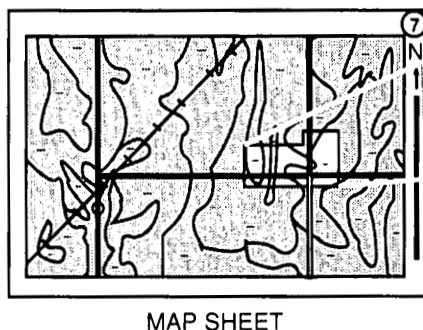
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Hart County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Mature burley tobacco surrounded by alfalfa and orchardgrass fields in an area of Crider silt loam, 2 to 6 percent slopes, eroded.

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Foreword

This soil survey contains information that can be used in land-planning programs in Hart County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



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Soil Survey of Hart County, Kentucky

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United States Department of Agriculture, Soil Conservation Service,
in cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky
Agricultural Experiment Station

HART COUNTY is in the south-central part of Kentucky (fig. 1). It is bounded on the west by Grayson and Edmonson Counties, on the east by Green County, on the north by Hardin and Larue Counties, and on the south by Barren and Metcalfe Counties.

The extreme western part of the county is in the Western Coalfields physiographic region, and the rest is in the Western Pennyroyal region. In 1980, the size of the county was about 418 square miles, or about 267,424 acres. Of this acreage, about 3,457 acres was water (30). About 7,400 acres was federally owned land, mainly Mammoth Cave National Park. In 1986, the population of Hart County was 15,700. The county seat is Munfordville.

The topography of the county is nearly level to steep. The northwestern and southern parts of the county are dominated by karst landscapes with scattered low hills or knobs. The southwestern and central parts of the county have steep hillsides capped with moderately wide or narrow ridges. The rest of the county consists of broad, undulating to rolling ridges broken by moderately steep or steep hillsides.

The Green River dissects Hart County from east to west, and the flood plain and terraces along this stream are very narrow. Elevation ranges from 440 feet at the point where the Green River leaves the county to 1,160

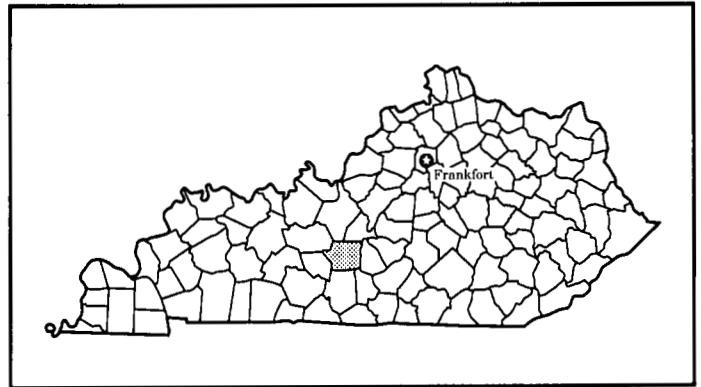


Figure 1.—Location of Hart County in Kentucky.

feet at the top of Frenchman Knob in the central part of the county.

Farming is the major enterprise in Hart County. Corn, tobacco, hay, and pasture are the main crops. Beef cattle, dairy cattle, and hogs are the most common livestock.

The county has some gas and oil wells. Sand, gravel, and limestone are major resources.

General Nature of the County

This section provides general information concerning history; geology; farming; natural resources; industry, transportation facilities, and recreation; and climate.

History

Hart County was formed in 1819 from parts of Barren, Green, and Hardin Counties. It was named for Captain Nathaniel G.T. Hart, the commander of the Lexington Light Infantry during the War of 1812 (12).

Early settlers entering the survey area found a heavily forested land rich in natural resources. The earliest settlements were along Bacon Creek and the upper reaches of Lynn Camp Creek. Some of the early settlements were Hammonville, Woodsonville, Horse Cave, and Munfordville.

In the early days of settlement, timber was cut for lumber and land was cleared for cultivation. The new cropland produced tobacco and corn. The number of livestock raised in the survey area grew as the production of grain increased.

Lime, iron, and gunpowder were produced in the early 1800's. Cannonballs and gunpowder made in the survey area were shipped by flatboats down the Green, Ohio, and Mississippi Rivers and were used by General Andrew Jackson in the last battle of the War of 1812, which was fought at New Orleans on January 8, 1815.

In 1862, Munfordville was the site of a Civil War battle. The remains of a fortification and earthworks are still visible on the battlefield (14).

Hidden River Cave and Mammoth Onyx Cave are part of a large cave system in the southern part of the county. In the early part of the 1900's, many people visited the area to explore these caves. Hidden River Cave, which is located in the middle of the business district in the community of Horse Cave, was eventually closed because of pollution.

Geology

Most of Hart County is located within the Western Pennyroyal physiographic region, but the western part is in the Western Coalfields region. The surficial geology of the survey area consists of level-bedded sedimentary rocks ranging in age from Lower Mississippian to Lower Pennsylvanian. Many of the upland areas are covered with a thin or moderately thick layer of loess. Alluvial areas contain water-deposited sediments derived from loess and from residual geologic material.

The oldest exposed rock in the survey area is the Fort Payne Formation, which is overlain by the Salem

and Warsaw Formations of the Upper Mississippian age (32). All three formations are limestone interbedded with siltstone or shale. They are in the southeastern part of the county and are exposed only along the deeper drainageways of rivers or creeks.

St. Louis Limestone caps much of the southern and eastern parts of the county (33). This formation is 175 to 200 feet thick and is of the Upper Mississippian age. It is overlain by St. Genevieve Limestone, which is of similar thickness, in the central part of the county. These two formations cover a wide portion of the eastern half of the county. In the western part, however, they are exposed only in valleys and drainageways. The limestone in these formations may be interbedded with dolomite, siltstone, or chert.

The landscape in the southern and eastern parts of the county is dominated by karst topography and thus is characterized by sinkholes and subterranean drainage. Many of the cave formations associated with the Mammoth Cave system in the western part of Hart County and in neighboring Edmonson County are part of the St. Genevieve Formation and of the lower part of the overlying Girkin Formation. In the eastern part of the county, the Girkin Limestone Formation is exposed only on the uppermost part of knobs, such as Puckett Knob (34). In the west-central part of the county, however, it is thicker and becomes more common near the edge of the more steeply dissected Western Coalfield physiographic region. The drainage patterns of the Western Coalfield region are dominantly surficial, as opposed to the subterranean drainage typical of the karst topography associated with the Western Pennyroyal region.

Three major formations are exposed in the western and northwestern parts of the county, in areas characterized by dissected landscapes—the Golconda Formation of the Chester Series, the Hardinsburg Formation, and the Glen Dean Limestone. The Golconda Formation overlies the Girkin Formation. It has two members. The Big Clifty Sandstone is 40 to 90 feet thick and is composed of fine grained sandstone interbedded with siltstone and shale. The Haney Limestone is 10 to 40 feet thick and is medium grained or coarse grained, chert-bearing limestone. The Hardinsburg Formation, which is of the Upper Mississippian age, overlies the Golconda Formation. It is 40 to 50 feet thick and is fine grained or very fine grained sandstone interbedded with siltstone. It is overlain by the Glen Dean Limestone. The Glen Dean Formation is similar in thickness to the Hardinsburg Formation. It is fine grained or medium grained, crystalline, thin-bedded to massive limestone interbedded with shale.

Overlying the Hardinsburg Formation is the Lower

Pennsylvanian aged Caseyville Formation. This formation is 50 to 100 feet thick and is medium grained or coarse grained, conglomeratic sandstone. It is in the western part of the county, mainly near the town of Cub Run, and trends toward the northeast (36).

In a large area of northeastern Hart County, limestone formations are covered by deposits of sandstone, siltstone, and conglomerate. These deposits derived from material of the Upper Mississippian and Lower Pennsylvanian age that eroded to form a thin veneer of rock overlying the St. Louis, St. Genevieve, and Girkin Formations (35). Extensive karst formations in the limestone began to collapse in Tertiary time, causing the younger materials to slump into solution cavities in the underlying formations.

Farming

The agricultural economy of Hart County is diverse and strong. In 1987, about 73.6 percent of the total acreage of the county was farmed. The county had 1,518 farms averaging about 128 acres in size. In 1988, the value of the county's agricultural products was \$33,513,000 (15).

In 1988, about 12,540 acres of row crops was harvested in the county, mainly corn, tobacco, wheat, and soybeans. About 7,391,000 pounds of burley tobacco was produced, making Hart County a leading producer of that crop.

Dairy and beef cattle are important to the agricultural economy of the county. In 1988, cash receipts from the sale of livestock accounted for an estimated 63 percent of all agricultural products marketed. The county had 13,500 beef cows, 7,700 milk cows, and 13,000 hogs and pigs.

Hay production is an integral part of crop rotations on most of the farms in the county. In 1988, about 31,000 acres was used for hay.

Specialty crops, such as nursery stock, truck crops, and small fruit, are grown on a few farms in the county.

Natural Resources

In addition to the soil, the major natural resources in Hart County are limestone, petroleum, natural gas, gravel, clay, and trees.

Oil and gas fields are throughout the county. A major gas field in the northeastern part is used for storage by the Louisville Gas and Electric Company. Most wells are used for local consumption.

Slumped conglomerate and sandstone are screened and washed at a gravel pit in the eastern part of the county near Aetna Furnace. Sand separates and

rounded quartz pebbles are sized for decorative and metallurgical uses.

Residual clay deposits are in some areas of slumped sandstone and shale in the central part of the county. These deposits have qualities of refractory grade clay and are 5 to 10 feet thick. The acreage of the deposits is small, and some pits that formerly were mined for clay are now closed.

Large tracts of land in the steeper uplands and smaller isolated tracts are used as woodland. About 110,700 acres in the county is forested (16). The dominant forest type is oak-hickory. A few commercial sawmills operate within the survey area. Much of the woodland has been logged, but the remaining areas represent a timber reserve for the future.

The supply of water is adequate for most domestic uses throughout most of the county. Many rural communities are serviced by rural water systems. The Green River supplies water for Munfordville, and the Green and Nolin Rivers provide water for irrigation, fishing, and boating. Farm ponds, small lakes, and creeks are used throughout the county for livestock water, irrigation, and swimming.

Industry, Transportation Facilities, and Recreation

Most of the manufacturing and commercial companies in Hart County are located in Munfordville and Horse Cave. In 1989, three companies manufactured hardwood mulch and wood pellets. These wood-products manufacturers and eight other companies provided employment to more than 350 people.

The county has one operating limestone quarry and a gravel pit. The limestone is used for road materials and agricultural lime, and the gravel pit excavates and screens sand and quartz pebbles.

Transportation facilities include a network of federal, state, and county highways that provide access to all parts of the area. Interstate 65 dissects the county and is accessible at Horse Cave, Munfordville, and Bonnieville. Some products are shipped and received by rail.

Tobacco, an important cash crop for the county, is marketed in Horse Cave. A large portion of the agricultural products is marketed outside the county. Burley tobacco is sold at warehouses in Cave City, Glasgow, Louisville, and Bowling Green. Most hogs and cattle that are not sold locally are trucked to stockyards and meat packing plants in surrounding counties and in Louisville. Most dairy products are sold to a local creamery and marketed through local cooperatives.

Grain not used locally is sold to processors, mills, and elevators, mainly in Louisville and Bowling Green.

Several areas in the county have recreational value. The many forested areas provide sites for hunting, camping, and nature study. About 5,427 acres of the Mammoth Cave National Park is within Hart County. Public use of this park is restricted, however, as it is being preserved as a wilderness area.

Nolin Lake is formed by a flood-control structure impounded by the U.S. Army Corp of Engineers in the Nolin River valley. More than 2,500 acres of this lake is within the county. The lake provides fishing, boating, camping, and picnic facilities. Numerous ponds and privately owned lakes provide good fishing for local residents.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Hodgenville in the period 1951 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 36 degrees F and the average daily minimum temperature is 25 degrees. The lowest temperature on record, which occurred at Hodgenville on January 17, 1977, is -15 degrees. In summer, the average temperature is 75 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Hodgenville on July 17, 1980, is 100 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 53 inches. Of this, about 28 inches, or 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 23 inches. The heaviest 1-day rainfall during the period of record was 4.97 inches at Hodgenville on September 14, 1979. Thunderstorms occur on about 45 days each year.

The average seasonal snowfall is about 15 inches. The greatest snow depth at any one time during the period of record was 16 inches. On the average, 14 days of the year have at least 1 inch of snow on the

ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining

their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the county, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area

dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

Some of the boundaries on the soil maps of Hart County do not match those on the soil maps of adjacent counties, and some of the soil names and descriptions do not fully agree. The differences are the result of modifications in soil series concepts or of variations in the intensity of mapping or in the extent of the soils in the survey area.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Bledsoe-Wallen-Wellston

Gently sloping to steep, very deep to moderately deep, well drained and somewhat excessively drained soils that have a clayey or loamy subsoil; on ridgetops and hillsides

The largest area of this map unit occurs in the higher elevations in the southwest corner of the county. Smaller areas are in the south-central part of the county. The unit consists of soils on moderately wide or narrow ridgetops and moderately steep hillsides (fig. 2). Slopes range from 2 to 30 percent.

This map unit makes up about 5 percent of the county. It is about 45 percent Bledsoe soils, 35 percent Wallen soils, 14 percent Wellston soils, and 6 percent soils of minor extent.

Bledsoe soils are very deep and well drained. They are moderately steep and steep. They are on hillsides. They formed in colluvium over material weathered from limestone, siltstone, shale, and sandstone. Typically, the surface layer is dark brown fine sandy loam. The subsurface layer is brown loam. The upper part of the

subsoil is strong brown clay loam. The next part is strong brown and yellowish brown clay. The lower part is mottled strong brown, yellowish brown, and yellowish red clay.

Wallen soils are moderately deep and somewhat excessively drained. They are moderately steep and steep. They are on hillsides. They formed in residuum and colluvium derived from sandstone, siltstone, and shale. Typically, the surface layer is very dark gray gravelly loam. The subsurface layer is brown gravelly sandy loam. The upper part of the subsoil is yellowish brown gravelly sandy loam and very gravelly sandy loam. The lower part is yellowish brown very cobbly sandy loam. It is underlain by hard sandstone bedrock.

Wellston soils are deep or very deep and are well drained. They are gently sloping to moderately steep. They are on ridgetops and hillsides. Typically, the surface layer is brown silt loam. The upper part of the subsoil is yellowish brown silt loam. The lower part is yellowish brown loam and strong brown clay loam. The substratum is mottled yellowish brown, red, and light yellowish brown sandy clay loam.

Of minor extent in this map unit are Tilsit, Caneyville, Fredonia, Hagerstown, Vertrees, Nolin, and Lily soils and sandstone rock outcrop. Tilsit soils are on ridgetops. Caneyville and Lily soils are on ridgetops and hillsides. Fredonia, Hagerstown, and Vertrees soils are on hillsides. Nolin soils are on flood plains. The rock outcrop is intermingled with the Wallen soils and also occurs as ledges.

Most of the acreage in this map unit is used as woodland or for recreation. The soils on ridgetops and the upper parts of hillsides in the higher elevations are suited to cultivated crops, pasture, and hay. Most of the soils in this unit, however, are poorly suited to cultivated crops because of the steep slopes, the depth to bedrock, and the hazard of erosion.

The soils in this map unit are suited to woodland. Plant competition, the equipment limitation, and the hazard of erosion are management concerns.

Most of the soils in this map unit are poorly suited to urban uses. The slope and the depth to bedrock are the main limitations.

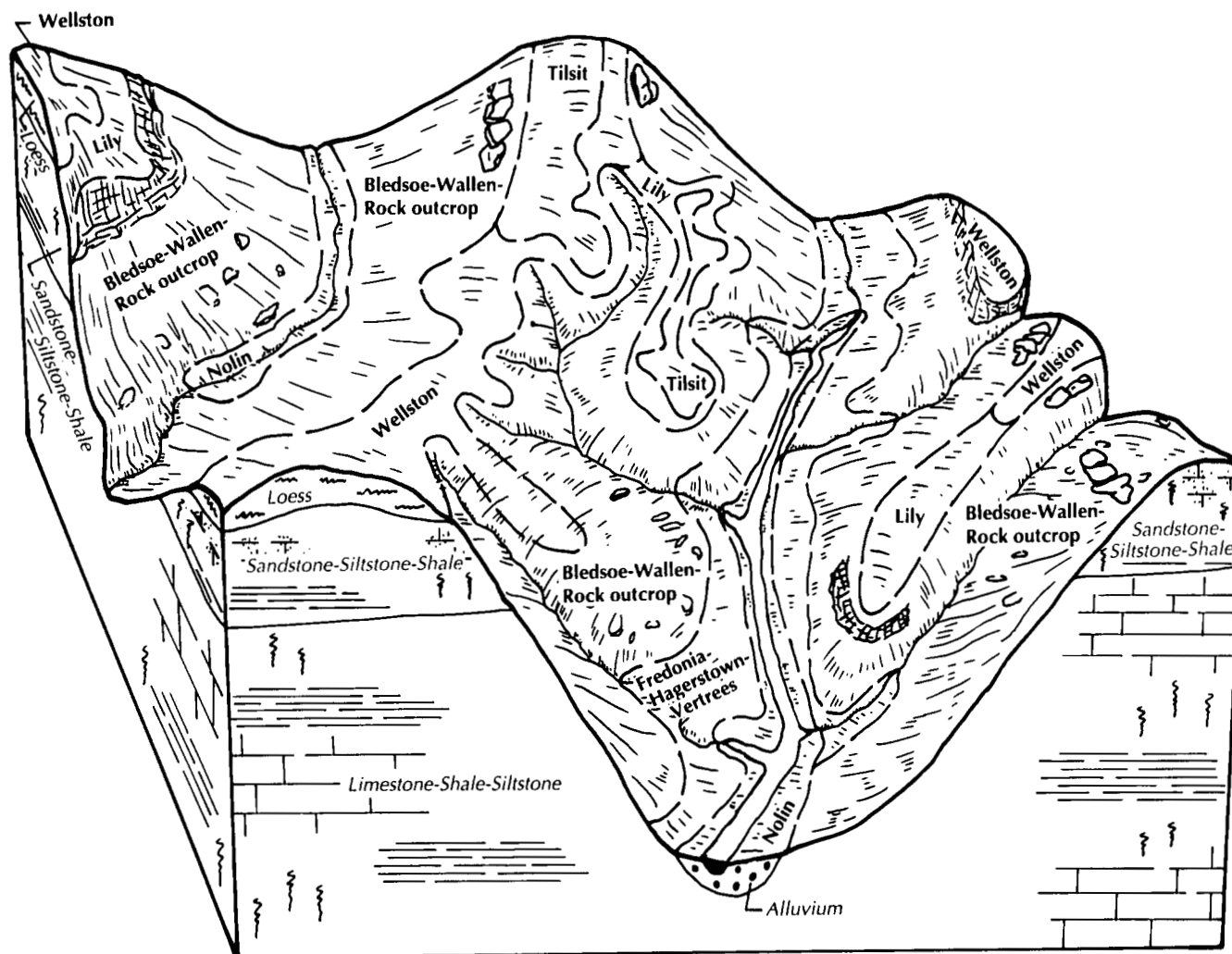


Figure 2.—Typical pattern of soils and underlying material in the Bledsoe-Wallen-Wellston general soil map unit.

2. Caneyville-Fredonia-Hagerstown

Gently sloping to steep, moderately deep and deep, well drained soils that have a clayey subsoil; on ridgetops and hillsides

This map unit is in small scattered areas throughout the county. It consists of soils on ridgetops and hillsides (fig. 3). Rock outcrop is common on some of the steeper hillsides. Sinks and depressions are landscape features. They collect surface water, which drains into underground streams. Some low hills or knobs are also in areas of this map unit. Slopes range from 2 to 30 percent.

This map unit makes up 22.7 percent of the county. It is about 28 percent Caneyville soils, 15 percent Fredonia soils, 9 percent Hagerstown soils, and 48

percent soils of minor extent.

Caneyville soils are moderately deep and are sloping to steep. They are on ridgetops and hillsides. They formed in material weathered from limestone. Typically, the surface layer is yellowish brown silt loam. The upper part of the subsoil is strong brown silty clay loam, and the lower part is yellowish red and strong brown clay.

Fredonia soils are moderately deep and are gently sloping or moderately sloping. They are on steep hillsides and ridgetops. They formed in material weathered from limestone. Typically, the surface layer is brown silt loam. The subsoil is red and reddish brown clay.

Hagerstown soils are deep and are gently sloping to moderately steep. They are on ridgetops and hillsides.

They formed in material weathered from limestone. Typically, the surface layer is brown silt loam. The upper part of the subsoil is yellowish red and red silty clay loam. The next part is red clay. The lower part is reddish brown, mottled clay.

Of minor extent in this map unit are Vertrees, Crider, Canmer, Riney, and Jefferson soils on ridgetops and hillsides; Allegheny and Elk soils on stream terraces; and Nolin, Newark, and Grigsby soils on flood plains.

Most of the acreage in this map unit is used for row crops, hay, or pasture. The soils in the gently sloping and sloping areas are suited to most of the commonly grown row crops, and most of the soils in the gently sloping to moderately steep areas are suited to pasture and hay. The slope, the depth to bedrock, and the hazard of erosion are management concerns.

Most of the soils in this map unit are suited to woodland. Management concerns are the hazard of

erosion, the equipment limitation, plant competition, and seedling mortality.

The soils in this map unit are suited to some urban uses. The slope, a moderate shrink-swell potential, the depth to bedrock, the clayey texture of the subsoil, and low strength are limitations.

3. Baxter-Crider

Gently sloping to steep, very deep, well drained soils that have a clayey or loamy subsoil; on ridgetops and hillsides

This map unit is in the south-central part of the county on a slightly rolling limestone plain characterized by many sinkholes and a few surface streams. Elevation on the karst plain ranges from 750 feet in the east to 640 feet in the west. The soils are on moderately wide ridgetops and irregularly shaped

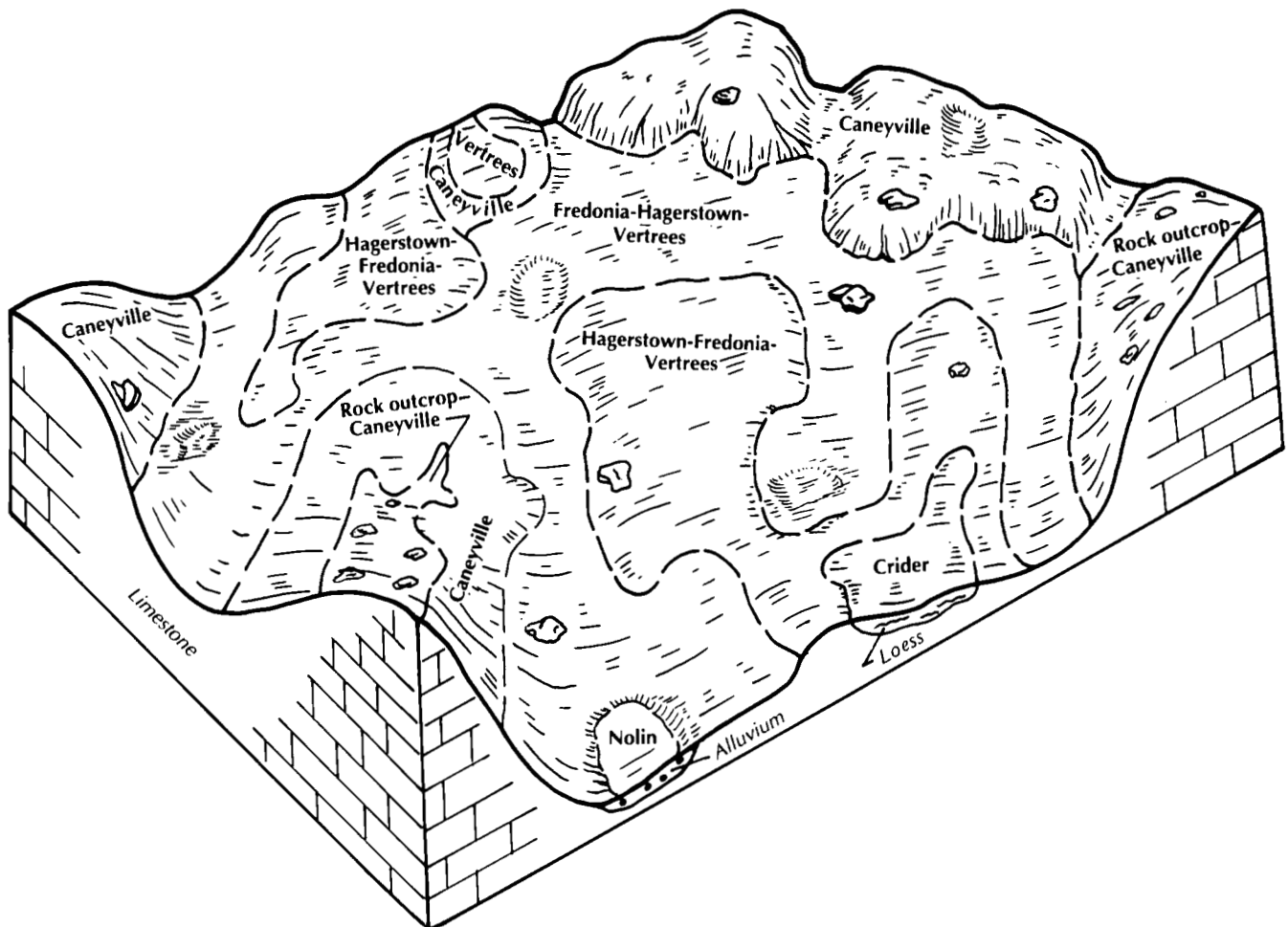


Figure 3.—Typical pattern of soils and underlying material in the Caneyville-Fredonia-Hagerstown general soil map unit.

hillsides (fig. 4). Slopes range from 2 to 30 percent.

This map unit makes up about 15 percent of the county. It is about 80 percent Baxter soils, 10 percent Crider soils, and 10 percent soils of minor extent.

Baxter soils are gently sloping to steep. They are on hillsides and around the rims of sinks and depressions. They formed in material weathered from limestone. Typically, the surface layer is brown gravelly silt loam. The upper part of the subsoil is yellowish red gravelly silty clay loam. The next part is dark red gravelly silty clay. The lower part is dark red gravelly clay or very gravelly clay and dusty red gravelly clay.

Crider soils are gently sloping and sloping. They are on broad, smooth ridgetops and the upper part of hillsides. They formed in a mantle of loess over material weathered from limestone. Typically, the surface layer is dark yellowish brown silt loam. The upper part of the subsoil is dark brown, dark yellowish brown, and strong

brown silt loam. The lower part is yellowish red silty clay loam and red silty clay.

Of minor extent in this map unit are Allegheny, Fredonia, Hagerstown, Vertrees, Caneyville, and Elk soils on uplands and stream terraces and Nolin and Newark soils on flood plains and in depressions.

Most of the acreage in this map unit is used for row crops, pasture, or hay. A few areas on the steeper hillsides are wooded.

The soils in this map unit are suited to most of the commonly grown row crops and small grain and are well suited to pasture and hay. The main limitations are the slope and the hazard of erosion.

The soils in this map unit are well suited to woodland. The main management concern is plant competition.

Most of the soils in this map unit are suited to urban uses. The slope, the clayey texture of the subsoil, a

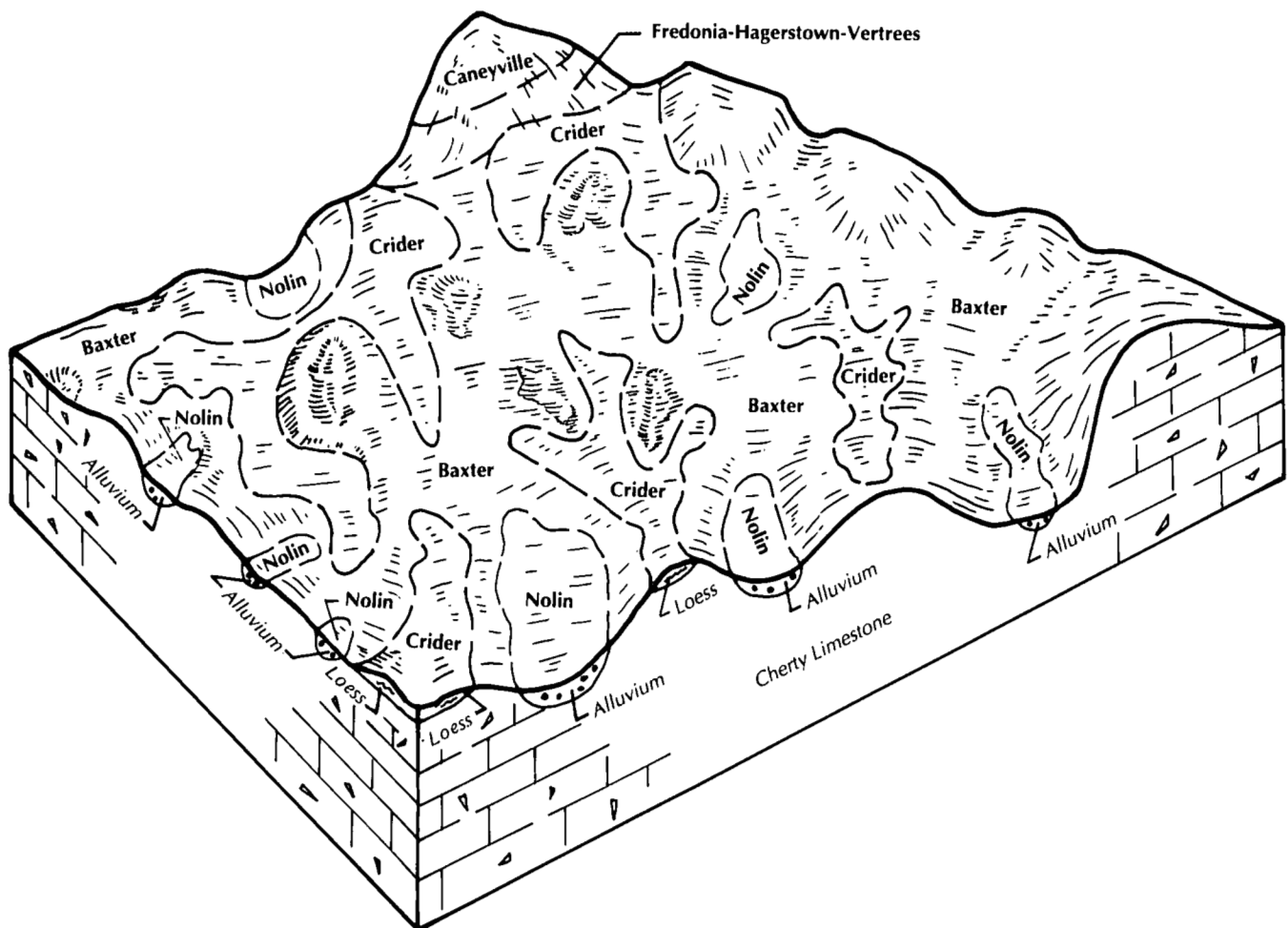


Figure 4.—Typical pattern of soils and underlying material in the Baxter-Crider general soil map unit.

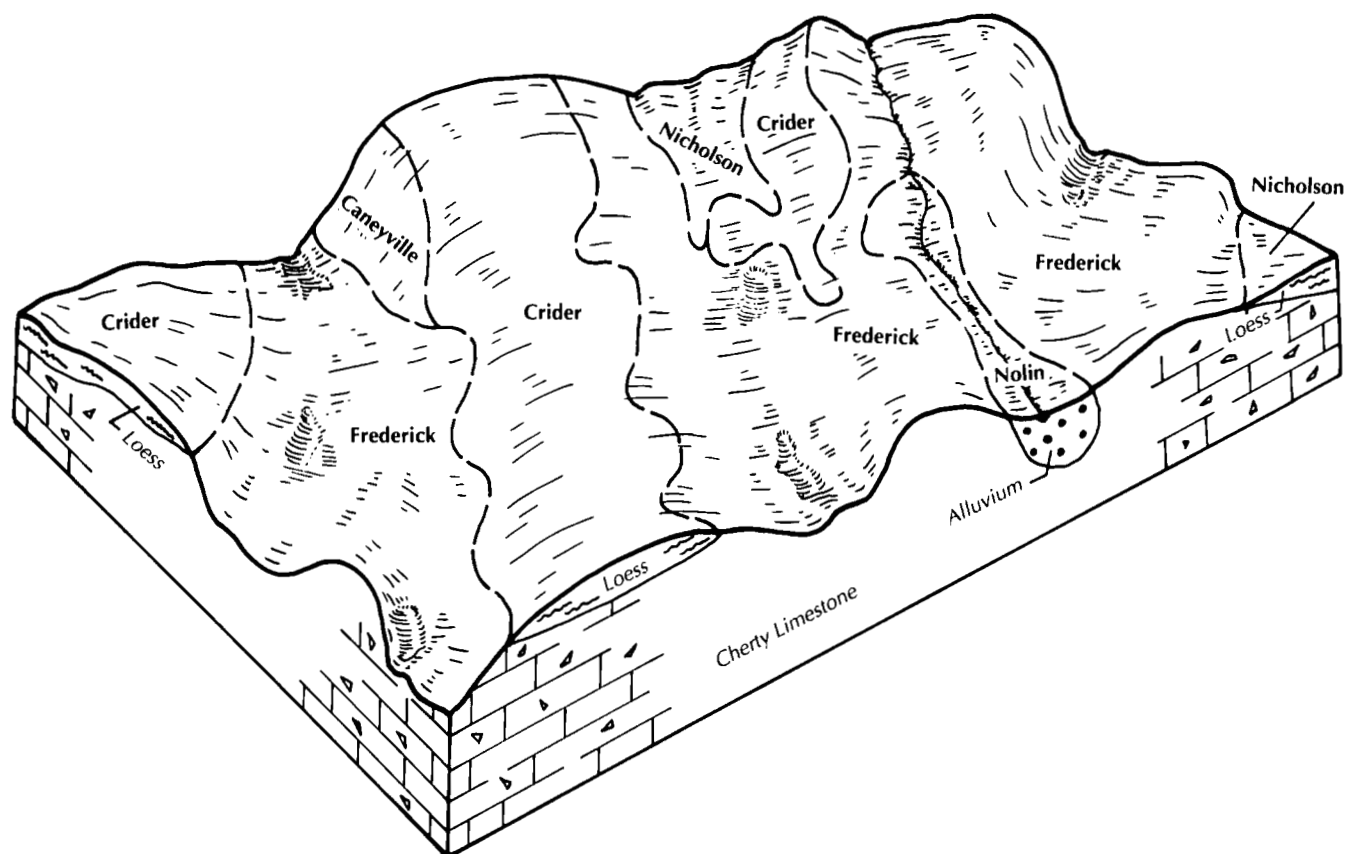


Figure 5.—Typical pattern of soils and underlying material in the Frederick-Crider general soil map unit.

moderate shrink-swell potential, and low strength are limitations.

4. Frederick-Crider

Gently sloping to steep, very deep, well drained soils that have an acid, clayey subsoil or a loamy subsoil; on ridgetops and hillsides

This map unit is in the eastern part of the county. It consists mostly of soils on moderately wide ridgetops and hillsides (fig. 5). The landscape is dotted with sinkholes and bowl-shaped depressions separated by narrow ridges. Slopes range from 2 to 30 percent.

This map unit makes up about 12 percent of the county. It is about 63 percent Frederick soils, 16 percent Crider soils, and 21 percent soils of minor extent.

Frederick soils are gently sloping to steep. They are on ridgetops and hillsides. They formed in material weathered from limestone and shale. Typically, the surface layer is dark brown silt loam. The upper part of

the subsoil is dark red clay and red clay. The lower part is red gravelly clay.

Crider soils are gently sloping and sloping. They are on moderately wide ridgetops and the upper part of hillsides. They formed in a mantle of loess over material weathered from limestone. Typically, the surface layer is dark yellowish brown silt loam. The upper part of the subsoil is dark brown, dark yellowish brown, and strong brown silt loam. The lower part is yellowish red silty clay loam and red silty clay.

Of minor extent in this map unit are Nicholson soils on upland ridgetops, Caneyville soils on hillsides, Melvin and Nolin soils in upland depressions and along drainageways, and Allegheny and Elk soils on stream terraces.

Most of the acreage in this map unit is used for row crops, pasture, or hay. The soils in this map unit are suited to most of the commonly grown row crops and are well suited to pasture and hay. The main limitations are the slope and the hazard of erosion.

The soils in this map unit are well suited to

woodland. Plant competition, the hazard of erosion, the equipment limitation, and seedling mortality are management concerns.

The soils in this map unit are suited to some urban uses. The slope, a moderate shrink-swell potential, the clayey texture of the subsoil, and low strength are limitations.

5. Melvin-Frederick-Otwell

Nearly level to sloping, very deep, poorly drained, well drained, and moderately well drained soils that have a loamy or clayey subsoil; on flood plains, ridgetops and hillsides, and terraces

This map unit is in the extreme southeastern part of the county from Pascal south to the Metcalfe county

line. It consists mostly of soils on ridgetops and in large, bowl-shaped depressions (fig. 6). Slopes range from 0 to 2 percent in the depressions and from 2 to 12 percent on ridgetops and hillsides.

This map unit makes up about 0.3 percent of the county. It is about 51 percent Melvin soils, 18 percent Frederick soils, 16 percent Otwell soils, and 15 percent soils of minor extent.

Melvin soils are nearly level and poorly drained. They are on flood plains. They formed in mixed alluvium. Typically, the surface layer is grayish brown silt loam. The subsurface layer is grayish brown, mottled silt loam. The subsoil is light brownish gray, mottled silt loam. The substratum is gray and light brownish gray, mottled silt loam.

Frederick soils are gently sloping and sloping and are

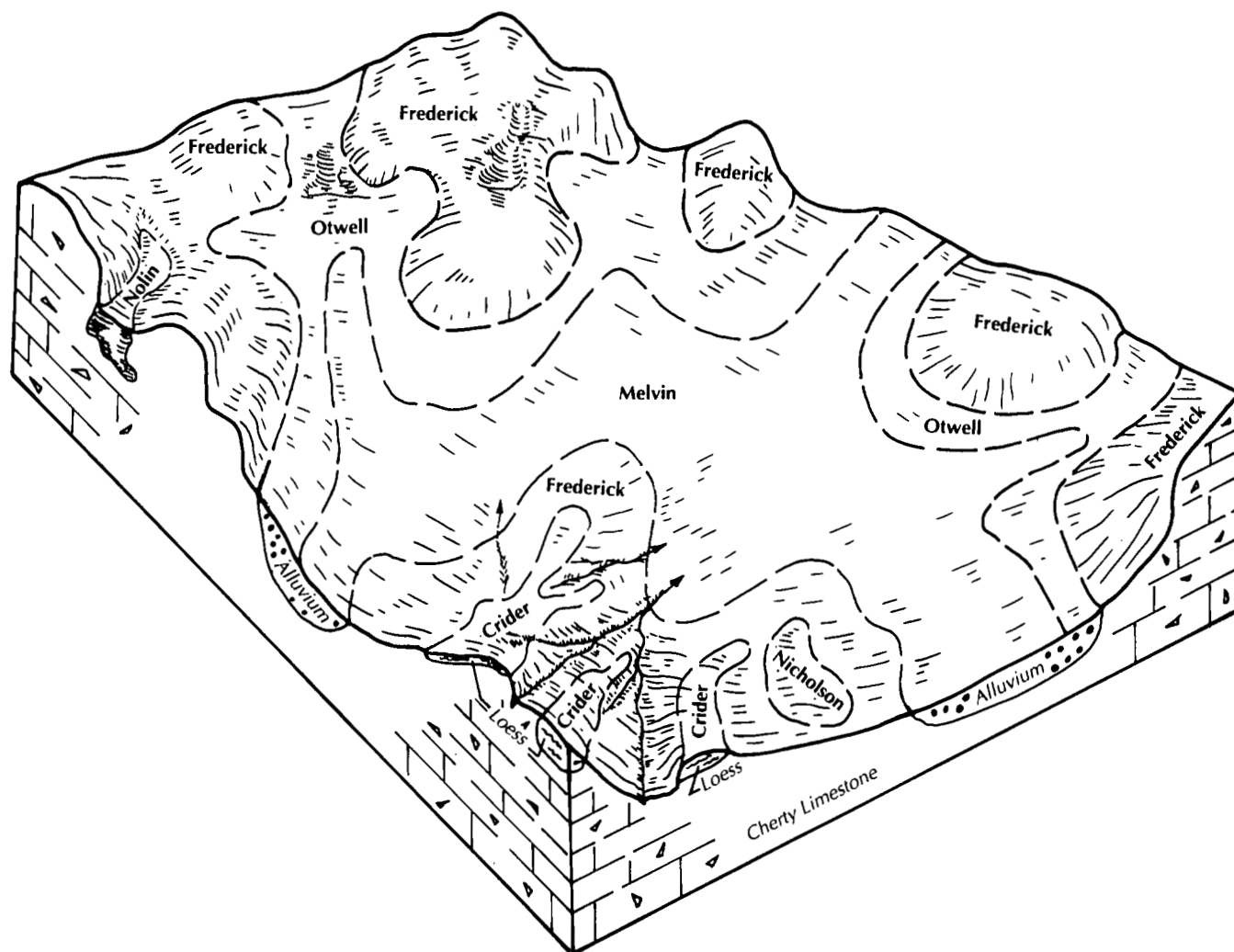


Figure 6.—Typical pattern of soils and underlying material in the Melvin-Frederick-Otwell general soil map unit.

well drained. They are on ridgetops and hillsides. They formed in material weathered from limestone and shale. Typically, the surface layer is dark brown silt loam. The upper part of the subsoil is dark red clay and red clay. The lower part is red gravelly clay.

Otwell soils are nearly level and moderately well drained. They are on terraces. They formed in old alluvium over material weathered from limestone. Typically, the surface layer is brown silt loam. The upper part of the subsoil is yellowish brown silt loam. The next part is light yellowish brown, mottled silt loam. The lower part is a firm, compact, and brittle fragipan of yellowish brown, mottled silt loam. The substratum is yellowish brown, mottled silt loam.

Of minor extent in this map unit are Crider, Baxter, and Nicholson soils on ridgetops and the upper part of hillsides and Nolin soils in depressions and drainageways.

Most of the acreage in this map unit is used for row crops, hay, or pasture. A few areas are wooded.

The soils in this map unit are suited to most of the commonly grown row crops and to pasture and hay. The main management concerns are wetness, flooding, ponding, and the slope.

The soils in this map unit are well suited to woodland. Plant competition, the hazard of erosion, the equipment limitation, and seedling mortality are management concerns.

The soils in this map unit are suited to some urban uses. Wetness, flooding, the slope, and low strength are limitations.

6. Nolichucky-Canmer

Gently sloping to steep, very deep, well drained soils that have a loamy or clayey subsoil; on ridgetops, hillsides, and stream terraces

This map unit is in the central and east-central parts of the county, mainly in the bends of the Green River. It consists mostly of soils on moderately wide ridgetops and hillsides (fig. 7). It is drained mainly by the Green River, but some areas are drained by sinks and depressions. Slopes range from 2 to 30 percent.

This map unit makes up about 3 percent of the county. It is about 42 percent Nolichucky soils, 18 percent Canmer soils, and 40 percent soils of minor extent.

Nolichucky soils are gently sloping to moderately steep. They are on ridgetops and the upper part of hillsides. They formed in alluvium and residuum derived mainly from limestone. Typically, the surface layer is dark yellowish brown loam. The subsurface layer is yellowish brown loam. The upper part of the subsoil is yellowish red loam. The next part is yellowish red and

red clay loam. Below this is dark red, mottled clay loam. The lower part of the subsoil is dark red clay.

Canmer soils are gently sloping to steep. They are on ridgetops and hillsides. They formed in old alluvium or material weathered from unconsolidated sandstone, limestone, and shale. Typically, the surface layer is brown silt loam. The upper part of the subsoil is brown silt loam and yellowish red silty clay loam. The next part is dark red, mottled clay. The lower part is mottled olive yellow, brownish yellow, dark red, and light gray clay.

Of minor extent in this map unit are Fredonia and Caneyville soils on ridgetops and hillsides; Allegheny, Otwell, and Elk soils on stream terraces; Grigsby, Nolin, Newark, and Lindsides soils on flood plains, along drainageways, and in depressions; and Baxter and Crider soils on ridgetops.

The soils in this map unit are used mostly for row crops or pasture. The soils are well suited to pasture and hay, and most of the soils are suited to the commonly grown row crops and small grain. The main management concerns are the slope and the hazard of erosion.

The soils in this map unit are well suited to woodland. Plant competition, the equipment limitation, and the hazard of erosion are management concerns.

The soils in this map unit are suited to some urban uses. The slope, the clayey texture of the subsoil, a moderate shrink-swell potential, and low strength are limitations.

7. Jefferson-Lily-Wellston

Gently sloping to steep, very deep to moderately deep, well drained soils that have a loamy subsoil; on ridgetops and hillsides

This map unit is in the western part of the county. It consists of soils on narrow ridgetops and hillsides (fig. 8). Many small creeks and intermittent streams are in areas of this map unit. Relief of as much as 200 feet is common. Slopes range from 2 to 30 percent.

This map unit makes up about 22 percent of the county. It is about 20 percent Jefferson soils, 17 percent Lily soils, 16 percent Wellston soils, and 47 percent soils of minor extent.

Jefferson soils are very deep and are moderately steep and steep. They are on hillsides. They formed in colluvium from siltstone, shale, and sandstone. Typically, the surface layer is brown fine sandy loam. The upper part of the subsoil is dark brown sandy loam. The next part is dark brown gravelly sandy loam. The lower part is strong brown and dark yellowish brown loam.

Lily soils are moderately deep and are sloping to steep. They are on ridgetops and hillsides. They formed

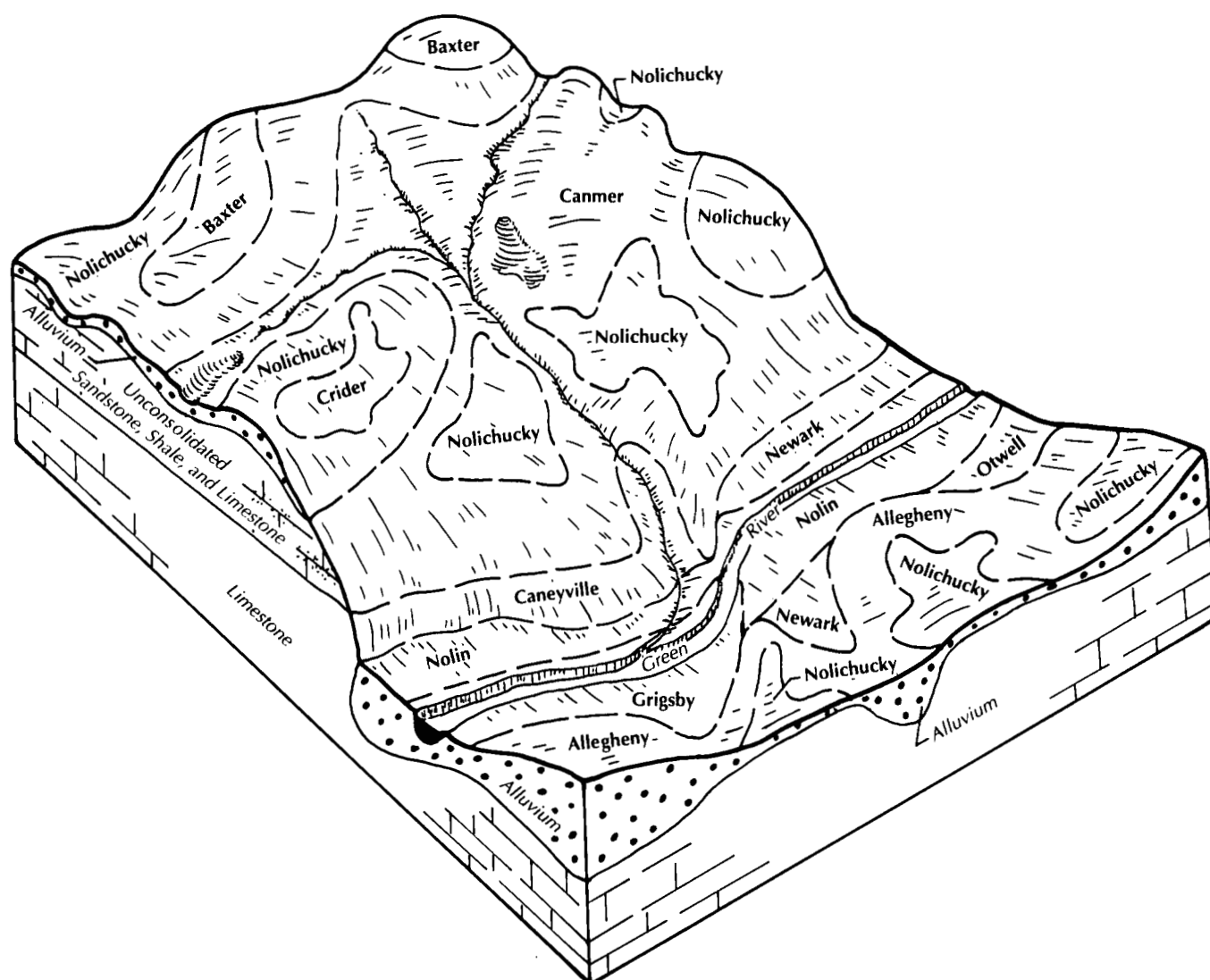


Figure 7.—Typical pattern of soils and underlying material in the Nolichucky-Canmer general soil map unit.

in material weathered from soft sandstone. Typically, the surface layer is dark brown loam. The subsurface layer is yellowish brown loam. The upper part of the subsoil is strong brown loam. The next part is yellowish red sandy clay loam and sandy loam. The lower part is strong brown sandy loam.

Wellston soils are deep and very deep and are gently sloping to moderately steep. They are on ridgetops and the upper part of hillsides. They formed in a cap of silt over material weathered from siltstone, shale, and sandstone. Typically, the surface layer is brown silt loam. The upper part of the subsoil is yellowish brown silt loam. The next part is yellowish brown loam. The

lower part is strong brown clay loam. The substratum is mottled yellowish brown, red, and light yellowish brown sandy clay loam.

Of minor extent in this map unit are Tilsit, Caneyville, Fredonia, Hagerstown, Vertrees, Nolin, Lenberg, and Lily soils and sandstone rock outcrop. Tilsit soils are on ridgetops. Caneyville and Lily soils are on ridgetops and hillsides. Fredonia, Hagerstown, and Vertrees soils are on hillsides. Lenberg soils are on the lower part of hillsides. Nolin soils are on flood plains. The rock outcrop occurs as discontinuous bluffs and ledges intermingled with the Jefferson and Lily soils on steep hillsides.

This map unit is used mostly as woodland or as wildlife habitat. Some areas are used for pasture or hay.

The soils in this map unit are suited to woodland. Plant competition, the equipment limitation, the hazard of erosion, and seedling mortality are management concerns.

The soils in this map unit are poorly suited to row crops and small grain. The slope, the depth to bedrock, and the hazard of erosion are limitations.

The soils in the gently sloping to moderately steep areas of this map unit are suited to pasture and hay. The slope and the hazard of erosion are management concerns.

The soils in this map unit are suited to some urban uses. The slope and the depth to bedrock are limitations.

8. Jefferson-Riney-Caneyville

Gently sloping to steep, very deep to moderately deep, well drained soils that have a loamy or clayey subsoil; on ridgetops and hillsides

This map unit is in the northern one-third of the county. It consists mostly of soils on narrow ridgetops and hillsides. The highest elevation in the county is in this unit. Several hills in the unit are at elevations greater than 1,000 feet. The highest, Frenchman Knob,

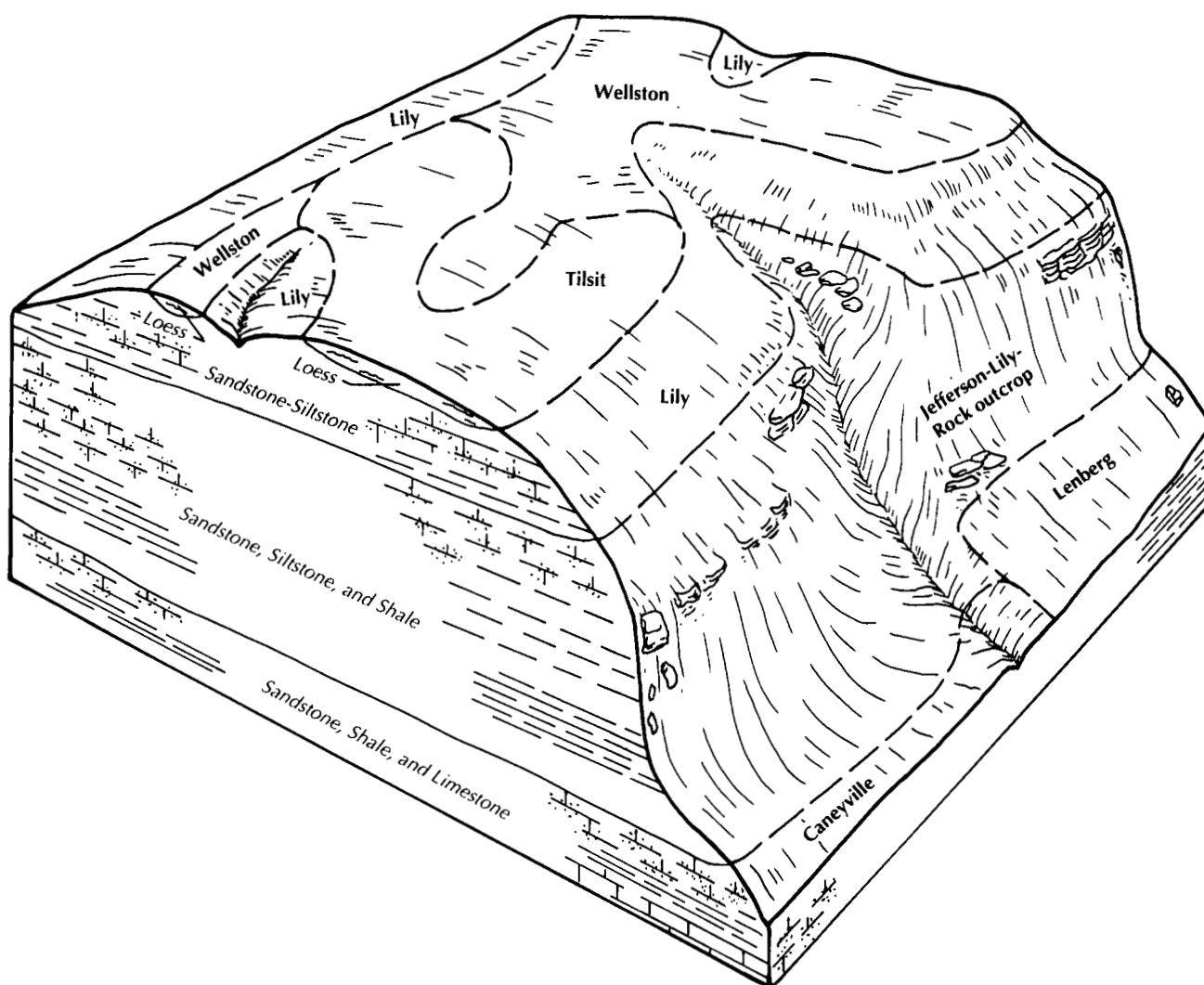


Figure 8.—Typical pattern of soils and underlying material in the Jefferson-Lily-Wellston general soil map unit.

is at an elevation of 1,156 feet. The unit is drained by Lynn Camp Creek and Bacon Creek. Some small streams drain into sinkholes. Slopes range from 2 to 30 percent.

This map unit makes up about 9 percent of the county. It is about 44 percent Jefferson soils, 20 percent Riney soils, 14 percent Caneyville soils, and 22 percent soils of minor extent.

Jefferson soils are very deep and are moderately steep and steep. They are on hillsides in the uplands. They formed in colluvium from siltstone, shale, and sandstone. Typically, the surface layer is brown fine sandy loam. The upper part of the subsoil is dark brown sandy loam. The next part is dark brown gravelly sandy loam. The lower part is strong brown and dark yellowish brown loam.

Riney soils are deep and very deep and are gently sloping to steep. They are on ridgetops and hillsides in the uplands. They formed in weakly consolidated sandstone and shale that in places has slumped into sinkholes. Typically, the surface layer is yellowish brown loam. The upper part of the subsoil is light yellowish brown loam. The next part is red clay loam. The lower part is red sandy clay loam. The substratum is red very gravelly sandy clay loam.

Caneyville soils are moderately deep and are sloping to steep. They are on hillsides in the uplands. They formed in material weathered from limestone. Typically, the surface layer is brown silt loam. The upper part of the subsoil is strong brown silty clay loam. The next part is yellowish red clay. The lower part is strong brown clay.

Of minor extent in this map unit are Allegheny, Sonora, Canmer, Lily, and Wellston soils on ridgetops and hillsides and Nolin, Newark, Lindside, and Grigsby soils on flood plains.

Most of the acreage in this map unit is used as woodland. Some areas are used for row crops, hay, or pasture.

The soils in this map unit are poorly suited to row crops and small grain because of the slope, the hazard of erosion, and rock outcrop.

Most of the soils in this map unit are suited to pasture and hay. The slope and the hazard of erosion are management concerns.

The soils in this map unit are suited to woodland. Plant competition, the equipment limitation, the hazard of erosion, and seedling mortality are management concerns.

The soils in this map unit are poorly suited to most urban uses because of the depth to bedrock, the slope, and the rock outcrop.

9. Riney-Sonora-Canmer

Gently sloping to steep, deep and very deep, well drained soils that have a clayey or loamy subsoil; on ridgetops and hillsides

This map unit is in the northeastern part of the county, directly north of the Green River. It consists mostly of soils on ridgetops and hillsides (fig. 9). Areas are drained by the Green River and Lynn Camp Creek. The landscape is dotted with sinks and depressions. Slopes range from 2 to 30 percent.

This map unit makes up about 9 percent of the county. It is about 37 percent Riney soils, 22 percent Sonora soils, 10 percent Canmer soils, and 31 percent soils of minor extent.

Riney soils are deep and very deep and are gently sloping to steep. They are on ridgetops and hillsides. They formed in unconsolidated or weakly consolidated sandstone and shale that in places has slumped into sinkholes. The surface layer is yellowish brown loam. The upper part of the subsoil is light yellowish brown loam. The next part is red clay loam. The lower part is red sandy clay loam. The substratum is red very gravelly sandy loam.

Sonora soils are very deep and are gently sloping and sloping. They are on ridgetops and the upper part of hillsides. They formed in a mantle of silt over unconsolidated sandstone and shale that has slumped into sinkholes. Typically, the surface layer is brown silt loam. The upper part of the subsoil is strong brown silt loam. The next part is strong brown clay loam. Below this is yellowish red, mottled clay loam. The lower part of the subsoil is mottled very pale brown, strong brown, and red clay loam. The substratum is very pale brown, mottled loam.

Canmer soils are very deep and are gently sloping to steep. They are on ridgetops and hillsides. They formed in old alluvium or in material weathered from unconsolidated sandstone, limestone, and shale. Typically, the surface layer is brown loam. The upper part of the subsoil is brown silt loam and yellowish red silty clay loam. The next part is dark red, mottled clay. The lower part is mottled olive yellow, dark red, and light gray clay.

Of minor extent in this map unit are Frederick and Gatton soils on ridgetops and hillsides; Elk, Otwell, Allegheny, and Lawrence soils on stream terraces; and Nolin, Lindside, and Grigsby soils on flood plains, along drainageways, and in depressions.

Most of the acreage in this map unit is used for row crops, hay, or pasture. Some areas are used as woodland.

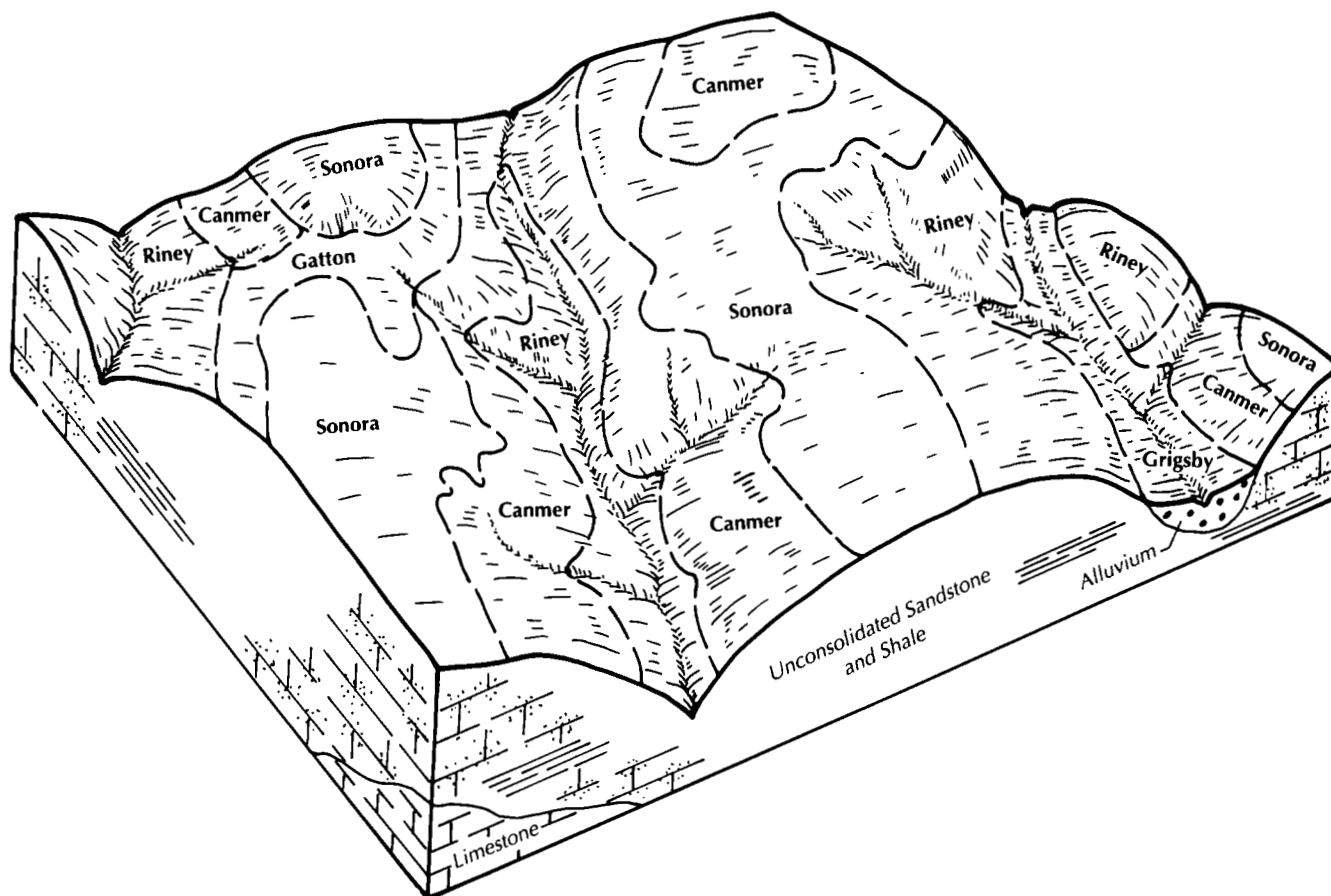


Figure 9.—Typical pattern of soils and underlying material in the Riney-Sonora-Canmer general soil map unit.

Some of the soils in this map unit are suited to row crops and small grain. The main limitations are the hazard of erosion and the slope.

The soils in this map unit are suited to woodland. Plant competition, the equipment limitation, and the hazard of erosion are management concerns.

The soils in this map unit are suited to some urban uses. The slope is the main limitation.

10. Caneyville-Vertrees

Gently sloping to steep, moderately deep and very deep, well drained soils that have a clayey subsoil; on hillsides and ridgetops

This map unit is located in the extreme northeastern part of the county. It is drained by Lynn Camp Creek and Brushy Fork Creek. Slopes range from 2 to 30 percent.

This unit makes up about 1 percent of the county. It is about 28 percent Caneyville soils, 20 percent

Vertrees soils, and 52 percent soils of minor extent.

Caneyville soils are moderately deep and are sloping to steep. They are on hillsides in the uplands. They formed in material weathered from limestone. Typically, the surface layer is yellowish brown silt loam. The upper part of the subsoil is brown silty clay loam. The lower part is yellowish red and strong brown clay.

Vertrees soils are very deep and are gently sloping to steep. They are on ridgetop and hillsides in the uplands. They formed in material weathered from limestone and shale. Typically, the surface layer is brown silt loam. The upper part of the subsoil is brown silty clay loam. The next part is yellowish red silty clay. The lower part is red or dark red, mottled clay.

Of minor extent in this map unit are Canmer, Riney, and Crider soils on hillsides and ridgetops; Nolin, Newark, and Grigsby soils on flood plains; and Elk soils on stream terraces.

The areas of this map unit on the gently sloping and sloping ridgetops are used for row crops, hay, or

pasture. Most of the moderately steep and steep hillsides are wooded.

The soils in the gently sloping and sloping areas of this map unit are suited to most of the commonly grown row crops and small grain, and most of the soils in the gently sloping to moderately steep areas are suited to pasture and hay. The slope, the depth to bedrock, and the hazard of erosion are management concerns.

Most of the soils in this map unit are suited to woodland. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are management concerns.

The soils in this map unit are suited to some urban uses. The slope, a moderate shrink-swell potential, the depth to bedrock, the clayey texture of the subsoil, and low strength are limitations.

11. Vertrees-Crider

Gently sloping to steep, very deep, well drained soils that have a clayey or loamy subsoil; on ridgetops and hillsides

This map unit is in the extreme north-central part of the county. It consists mostly of soils on moderately wide ridgetops and hillsides. It is dissected in most areas by small streams and drainageways. The western edge of the area is dominated by karst topography. Slopes range from 2 to 30 percent.

This map unit makes up about 1 percent of the county. It is about 36 percent Vertrees soils, 34 percent Crider soils, and 30 percent soils of minor extent.

Vertrees soils are gently sloping to steep. They are

on ridgetops and hillsides in the uplands. They formed in material weathered from limestone and shale. Typically, the surface layer is brown silt loam. The upper part of the subsoil is brown silty clay loam. The next part is yellowish red silty clay. The lower part is red or dark red, mottled clay.

Crider soils are gently sloping and sloping. They are on moderately wide ridgetops and the upper part of hillsides in the uplands. They formed in a mantle of loess over material weathered from limestone. Typically, the surface layer is dark yellowish brown silt loam. The upper part of the subsoil is dark brown, dark yellowish brown, and strong brown silt loam. The lower part is yellowish red silty clay loam and red silty clay.

Of minor extent in this map unit are Canmer and Nicholson soils on ridgetops and hillsides and Lindside, Nolin, Newark, and Grigsby soils in small streams, along drainageways, and in depressions.

Most of the acreage of this map unit is used for row crops, pasture, or hay. The soils are suited to most of the commonly grown row crops and small grain and are well suited to pasture and hay. The slope and the hazard of erosion are the main management concerns.

The soils in this map unit are well suited to woodland. Plant competition, the hazard of erosion, the equipment limitation, and seedling mortality are management concerns.

The soils in this map unit are suited to some urban uses. The slope, a moderate shrink-swell potential, the clayey texture of the subsoil, and low strength are limitations.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Riney loam, karst, 2 to 6 percent slopes, is a phase of the Riney series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Bledsoe-Wallen-Rock outcrop complex, 20 to 30 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ

substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Soil Descriptions

AIA—Allegheny loam, 0 to 2 percent slopes, rarely flooded. This very deep, well drained, nearly level soil is on convex, low stream terraces and benches at elevations slightly higher than the flood plains. Individual areas range from about 10 to 20 acres in size.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsurface layer to a depth of about 17 inches is dark yellowish brown loam. The upper part of the subsoil, from a depth of 17 to 32 inches, is yellowish brown loam. The lower part to a depth of about 48 inches is strong brown sandy clay loam. The substratum to a depth of about 62 inches is strong brown fine sandy loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is low or moderate. Tilth is good. The soil is subject to rare flooding. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Elk and Otwell soils.

Most of the acreage of the Allegheny soil is used for

pasture or crops. This soil is well suited to all of the commonly grown row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and maintain productivity.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Yellow poplar, white ash, red maple, and northern red oak are the dominant native trees. Some of the trees preferred for planting are black walnut, eastern white pine, and yellow poplar. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The flooding is a concern on sites for most sanitary facilities and most kinds of building site development.

The capability classification is I.

AIB—Allegheny loam, 2 to 6 percent slopes, rarely flooded. This very deep, well drained, gently sloping soil is on convex, low stream terraces and at elevations slightly higher than the flood plains. Individual areas range from about 5 to 15 acres in size.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsurface layer to a depth of about 17 inches is dark yellowish brown loam. The upper part of the subsoil, from a depth of 17 to 32 inches, is yellowish brown loam. The lower part to a depth of about 48 inches is brown sandy clay loam. The substratum to a depth of about 62 inches is strong brown fine sandy loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is low or moderate. Tilth is good. The soil is subject to rare flooding. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Elk and Otwell soils. Also included are a few eroded areas.

Most of the acreage of the Allegheny soil is used for pasture or crops. This soil is well suited to all of the

commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. Applying a system of conservation tillage (fig. 10), planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Yellow poplar, white ash, red maple, and northern red oak are the dominant native trees. Some of the trees preferred for planting are black walnut, eastern white pine, and yellow poplar. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The flooding is a concern on sites for most sanitary facilities and most kinds of building site development.

The capability classification is IIe.

AIC—Allegheny loam, 6 to 12 percent slopes, rarely flooded. This very deep, well drained, sloping soil is on convex stream terraces and benches at elevations slightly higher than the flood plains. Individual areas range from about 5 to 15 acres in size.

Typically, the surface layer is dark yellowish brown loam about 10 inches thick. The subsurface layer to a depth of about 17 inches is dark yellowish brown loam. The upper part of the subsoil, from a depth of 17 to 32 inches, is yellowish brown loam. The lower part to a depth of about 48 inches is strong brown sandy clay loam. The substratum to a depth of about 60 inches is strong brown fine sandy loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is low or moderate. The soil is subject to rare flooding. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Elk and Otwell soils. Also included are small areas of Nolichucky soils on the higher stream terraces and Nolin and Lindsides soils in low alluvial areas and drainageways.

Most of the acreage of the Allegheny soil is used for



Figure 10.—Conservation tillage in an area of Allegheny loam, 2 to 6 percent slopes, rarely flooded.

pasture or crops. This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be

those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Yellow poplar, white ash, red maple, and northern red oak are the dominant native trees. Some of the trees preferred for

planting are black walnut, eastern white pine, and yellow poplar. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The flooding and the slope are concerns on sites for most sanitary facilities and most kinds of building site development.

The capability classification is IIIe.

BaB—Baxter gravelly silt loam, 2 to 6 percent slopes. This very deep, well drained, gently sloping soil is on slightly convex, moderately wide ridgetops in the southern part of the county. A few areas have sinks and depressions. Individual areas are irregular in shape and range from about 3 to 10 acres in size.

Typically, the surface layer is brown gravelly silt loam about 7 inches thick. The upper part of the subsoil to a depth of 13 inches is yellowish red gravelly silty clay loam. The next part, from a depth of 13 to 28 inches, is dark red silty clay. The lower part to a depth of 73 inches or more is dark red gravelly clay and very gravelly clay and dusky red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. The soil is somewhat difficult to till because of the content of chert fragments in the surface layer. The shrink-swell potential is moderate. The root zone is very deep. The depth to hard bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Fredonia, Hagerstown, Vertrees, and Crider soils. These soils are in landscape positions similar to those of the Baxter soil. Also included are soils that are similar to the Baxter soil but have less than 5 percent chert fragments in the surface layer or are eroded or severely eroded.

Most areas of the Baxter soil are used for crops or pasture. This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. Applying a system of conservation tillage, returning crop residue to the soil, and including grasses and legumes in the cropping sequence help to control erosion. Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, frequent renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, white oak, and yellow poplar are the dominant native trees.

Some of the trees preferred for planting are shortleaf pine, yellow poplar, and eastern white pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to urban uses. The moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

BaC2—Baxter gravelly silt loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is on uplands dotted with many sinks and depressions and on the upper part of hillsides in the southern part of the county. Most areas of this soil are extensive. Individual areas range from about 3 to more than 900 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown gravelly silt loam about 4 inches thick. The upper part of the subsoil to a depth of about 10 inches is yellowish red gravelly silty clay loam. The next part, from a depth of 10 to 25 inches, is dark red silty clay. The lower part to a depth of 70 inches or more is dark red gravelly clay and very gravelly clay and dusky red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. The soil is somewhat difficult to till because of the content of chert fragments in the surface layer. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Fredonia, Hagerstown, Vertrees, and Crider soils. These soils are in landscape positions similar to those of the Baxter soil. Also included are soils that are similar to the Baxter soil but have less than 5 percent chert fragments in the surface layer and subsoil. On landscapes with karst topography, areas of severely eroded Baxter soils are included. They are around the rims of depressions.

Most areas of the Baxter soil are used for crops or pasture. A few areas are idle land.

This soil is suited to row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. Applying a system of conservation tillage, returning crop residue to the soil, and including grasses and legumes in the cropping sequence help to control erosion and maintain tilth and organic matter content.



Figure 11.—Alfalfa hay on karst landscapes in an area of Baxter gravelly silt loam, 6 to 12 percent slopes, eroded.

This soil is well suited to pasture and hay (fig. 11). All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, frequent renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, white oak, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, yellow poplar, and eastern white pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are concerns on sites for some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the

soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

BaD2—Baxter gravelly silt loam, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on hillsides. Most areas are small and narrow. Individual areas range from about 4 to more than 60 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer. Sinks and depressions are common.

Typically, the surface layer is brown gravelly silt loam about 4 inches thick. The upper part of the subsoil to a depth of about 10 inches is yellowish red gravelly silty clay loam. The next part, from a depth of 10 to 25 inches, is dark red silty clay. The lower part to a depth of 70 inches or more is dark red gravelly clay and very gravelly clay and dusky red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. The soil is somewhat difficult to till because of the content of chert fragments in the surface layer. The shrink-swell potential is moderate. The root zone is very deep. The depth to hard bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Fredonia, Hagerstown, and Vertrees soils. These soils are in landscape positions similar to those of the Baxter soil. Also included are soils that are similar to the Baxter soil but have less than 5 percent chert fragments in the surface layer and subsoil or are severely eroded. A few areas of rock outcrop are included, generally at the base of slopes.

Most areas of the Baxter soil are used for pasture. Some areas support second-growth trees or are idle land.

This soil is suited to limited use for row crops and small grain. The hazard of erosion is very severe if a conventional tillage method is used. Applying a system of conservation tillage, returning crop residue to the soil, and planting cover crops help to control erosion. Tilth can be maintained by returning crop residue to the soil.

This soil is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. Applications of lime and fertilizer, frequent renovation, rotation grazing, proper stocking rates, and timely deferment of grazing prolong the life of desirable forage species and thus improve the quality and quantity of the forage.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, white oak, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, yellow poplar, and eastern white pine. Plant competition, the hazard of erosion, and the equipment limitation are the main management concerns in wooded areas. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

BaE—Baxter gravelly silt loam, 20 to 30 percent slopes. This very deep, well drained, steep soil is on hillsides and around the rims of deep depressions in the southern part of the county. Individual areas range from

about 3 to more than 26 acres in size. Sinks and depressions are common.

Typically, the surface layer is brown gravelly silt loam about 4 inches thick. The upper part of the subsoil to a depth of about 10 inches is yellowish red gravelly silty clay loam. The next part, from a depth of 10 to 25 inches, is dark red silty clay. The lower part to a depth of 70 inches or more is dark red gravelly clay and very gravelly clay and dusky red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter and the shrink-swell potential are moderate. The root zone is very deep. The depth to hard bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Baxter soil but have less than 5 percent chert fragments in the surface layer and subsoil. These soils are in landscape positions similar to those of the Baxter soil. Also included are a few areas of rock outcrop, generally at the base of slopes.

Most areas of the Baxter soil are used for pasture or woodland. A few areas are idle land.

This soil is poorly suited to row crops because of the slope. It is suited to pasture and hay, but the slope and the content of chert fragments in the surface layer hinder the establishment and maintenance of grasses and legumes. Most grasses and legumes grow well, but species that require the least amount of renovation should be selected. Pasture renovation, rotation grazing, and mowing to control weeds and woody vegetation prolong the life of desirable forage species and thus improve the quality and quantity of the forage.

This soil is well suited to woodland. Black oak, white oak, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, yellow poplar, and eastern white pine. The hazard of erosion, the equipment limitation, and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the clayey texture, the moderate permeability, and the moderate shrink-swell potential are limitations.

The capability classification is VIe.

BmE—Bledsoe-Wallen-Rock outcrop complex, 20 to 30 percent slopes. These moderately deep and very deep, well drained and somewhat excessively drained, steep soils and Rock outcrop are on hillsides and knolls south of the Green River. Individual areas range from about 50 to 500 acres in size. The Bledsoe soil makes up about 35 percent of the map unit, the Wallen soil about 25 percent, and the Rock outcrop about 15 percent.

Typically, the surface layer of the Bledsoe soil is dark brown fine sandy loam about 5 inches thick. The upper

part of the subsoil to a depth of about 12 inches is brown loam. The next part, from a depth of 12 to 22 inches, is strong brown clay loam. The lower part to a depth of about 62 inches is strong brown or yellowish brown clay or mottled strong brown and yellowish red clay.

Permeability is moderately slow in the Bledsoe soil. Available water capacity is high. The content of organic matter is high. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Typically, the surface layer of the Wallen soil is very dark gray gravelly loam about 2 inches thick. The subsurface layer is brown gravelly sandy loam about 4 inches thick. The upper part of the subsoil is yellowish brown gravelly sandy loam or very gravelly sandy loam about 14 inches thick. The lower part is yellowish brown very cobbly sandy loam about 10 inches thick. Hard sandstone bedrock is at a depth of about 30 inches.

Permeability is moderately rapid in the Wallen soil. Available water capacity is low. The content of organic matter is low. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

The Rock outcrop typically occurs as discontinuous exposures of sandstone bedrock in the form of cliffs and ledges in the upper part of the map unit. The outcrops are about 10 to 30 feet thick and are part of the Big Clifty Sandstone Formation.

Included in mapping are small areas of Caneyville, Lily, and Jefferson soils. Also included are soils that are shallow over sandstone bedrock. Included soils make up about 25 percent of the map unit.

Most of the acreage in this map unit is used as woodland. The soils are suited to woodland. In areas of the Bledsoe soil, native trees include yellow poplar and black walnut on cool aspects and yellow poplar, pignut hickory, and Virginia pine on warm aspects. In areas of the Wallen soil, native trees include black oak, shortleaf pine, and Virginia pine on cool and warm aspects. Some of the trees preferred for planting are shortleaf pine, white ash, and loblolly pine. The hazard of erosion, the equipment limitation, seedling mortality, and plant competition are management concerns. The Rock outcrop restricts the use of wheeled and track equipment. See table 7 for specific information relating to potential productivity.

The soils in this map unit are poorly suited to row crops and pasture because of the slope. They are poorly suited to most urban uses because of the slope and the depth to bedrock.

The capability classification of the Bledsoe and Wallen soils is VIe, and that of the Rock outcrop is VIIIs.

CaD—Caneyville silt loam, very rocky, 6 to 20 percent slopes. This moderately deep, well drained, sloping to moderately steep soil is on hillsides on limestone uplands throughout the county. Rock outcrop makes up about 7 percent of the map unit. Slopes are smooth and convex. Some areas are characterized by karst topography. Individual areas range from about 3 to 130 acres in size.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown silty clay loam. The next part to a depth of 21 inches is yellowish red clay. The lower part is strong brown clay about 3 inches thick. Limestone bedrock is at a depth of about 24 inches.

Permeability is moderately slow. Available water capacity and the content of organic matter are moderate. The shrink-swell potential also is moderate. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Fredonia, Riney, Bledsoe, Hagerstown, and Vertrees soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are gullied areas, areas of shallow soils that have a dark surface layer, and a few small areas of eroded Caneyville soils.

Most areas of the Caneyville soil are used for pasture or woodland.

This soil is poorly suited to row crops and small grain because of the slope and the stones on the surface. It is suited to pasture and hay, but the slope and the stones on the surface are limitations (fig. 12). Species that do not require frequent renovation and that provide an adequate ground cover should be selected for planting. Stocking rates should be adjusted to prevent overgrazing.

This soil is suited to woodland. Black oak, white oak, sugar maple, and hickory are the dominant native trees. Some of the trees preferred for planting are eastern white pine, yellow poplar, and white oak. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The depth to bedrock, the rock outcrop, the slope, the moderately slow permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and



Figure 12.—Outcrops of limestone in an area of Caneyville silt loam, very rocky, 6 to 20 percent slopes, used for pasture.

installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is VI_s.

CaE—Caneyville silt loam, very rocky, 20 to 30 percent slopes. This moderately deep, well drained, steep soil is on hillsides in the uplands throughout the survey area. Rock outcrop makes up about 7 percent of the map unit. Individual areas of this unit range from about 5 to 275 acres in size.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown

silty clay loam. The next part to a depth of 21 inches is yellowish red clay. The lower part is strong brown clay about 3 inches thick. Limestone bedrock is at a depth of about 24 inches.

Permeability is moderately slow. Available water capacity and the content of organic matter are moderate. The shrink-swell potential also is moderate. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Fredonia, Riney, and Vertrees soils. These soils are in landscape positions similar to those of the Caneyville soil.

Most areas of the Caneyville soil are used for pasture or woodland.

This soil is poorly suited to row crops and small grain because of the slope and the stones on the surface. It is suited to pasture, but the slope and the stones on the surface are limitations. Species that do not require frequent renovation and that provide an adequate ground cover should be selected for planting. Stocking rates should be adjusted to prevent overgrazing.

This soil is suited to woodland. Black oak, sugar maple, and yellow poplar are the dominant native trees on cool aspects, and white oak, eastern redcedar, and scarlet oak are dominant on warm aspects. Some of the trees preferred for planting are yellow poplar, eastern white pine, and northern red oak. The hazard of erosion, the equipment limitation, plant competition, and seedling mortality are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses. The depth to bedrock, the rock outcrop, the slope, the moderately slow permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is Vle.

CeD3—Caneyville silty clay loam, very rocky, 6 to 20 percent slopes, severely eroded. This moderately deep, well drained, sloping to moderately steep soil is on limestone hillsides in the uplands throughout the county. Intermingled areas of rock outcrop make up 7 to 10 percent of the map unit. Slopes are smooth and convex. Some areas are characterized by karst topography. Individual areas range from about 5 to 210 acres in size. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown silty clay loam about 3 inches thick. The upper part of the subsoil, from a depth of 3 to 14 inches, is strong brown silty clay loam. The next part to a depth of 21 inches is yellowish red clay. The lower part is strong brown clay about 3 inches thick. Limestone bedrock is at a depth of about 24 inches.

Permeability is moderately slow. The content of organic matter is low. Available water capacity is moderate. The shrink-swell potential also is moderate. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Fredonia, Hagerstown, Riney, and Vertrees

soils. These soils are in landscape positions similar to those of the Caneyville soil.

Most areas of the Caneyville soil are used for pasture or woodland.

This soil is poorly suited to row crops and small grain because of the slope and the stones on the surface. It is suited to pasture and hay, but the slope and the effects of past erosion are limitations. Species that do not require frequent renovation and that provide an adequate ground cover should be selected for planting.

This soil is suited to woodland. Black oak, white oak, and hickory are the dominant native trees. Some of the trees preferred for planting are eastern redcedar and Virginia pine. The hazard of erosion, the equipment limitation, and seedling mortality are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses. The depth to bedrock, the slope, the rock outcrop, the moderately slow permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is Vle.

CnB—Canmer silt loam, 2 to 6 percent slopes. This very deep, well drained, gently sloping soil is on ridgetops and karst landscapes, mainly in the central part of the county. Slopes are smooth. In the areas characterized by karst topography, depressions and sinks are common. Individual areas of this soil range from about 4 to 32 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 24 inches, is brown silt loam and yellowish red silty clay loam. The next part, from a depth of 24 to 59 inches, is dark red, mottled clay. The lower part to a depth of about 75 inches is mottled olive yellow, brownish yellow, dark red, and light gray clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Canmer soil but have a surface layer of sandy loam, loam, gravelly sandy loam, or gravelly loam. These soils are in landscape positions similar to those of the Canmer soil. Also included are a few areas

of eroded Canmer soils and a few small areas of Crider, Riney, and Vertrees soils.

Most areas of the Canmer soil are used for pasture or are idle land. This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to row crops and small grain. All of the commonly grown crops grow well. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage, no-till farming, crop residue management, and a cropping sequence that includes cover crops help to control erosion.

This soil is suited to woodland. Yellow poplar, white oak, and southern red oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, eastern white pine, and shortleaf pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope, the clayey texture, and the moderate shrink-swell potential are limitations affecting some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

CnC2—Canmer silt loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is on ridgetops and karst landscapes, mainly in the central and northeastern parts of the county. Slopes are convex. In the areas characterized by karst topography, the slope varies within short distances and depressions and sinks are common. Individual areas of this soil range from about 12 to 200 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 24 inches, is brown silt loam and yellowish red silty clay loam. The next part, from a depth of 24 to 59 inches, is dark red, mottled clay. The lower part to a depth of about 75 inches is mottled olive yellow,

brownish yellow, dark red, and light gray clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil is mapping are soils that are similar to the Canmer soil but have a surface layer of sandy loam, loam, gravelly sandy loam, or gravelly loam. These soils are in landscape positions similar to those of the Canmer soil. Also included are a few areas of severely eroded Canmer soils and a few small areas of Crider, Riney, Nolichucky, Sonora, and Vertrees soils.

Most areas of the Canmer soil are used for pasture or are idle land. This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage, crop residue management, and a cropping sequence that includes cover crops help to control erosion.

This soil is suited to woodland, but few areas are used for the production of timber. Yellow poplar, white oak, and southern red oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, eastern white pine, and shortleaf pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope, the clayey texture, and the moderate shrink-swell potential are limitations affecting some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

CnD2—Canmer silt loam, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on ridges, hillsides, and karst landscapes, mainly in the central and northeastern parts of the county. Slopes are convex. In the areas characterized by karst

topography, the slope varies within short distances. Individual areas of this soil range from about 5 to 300 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 24 inches, is yellowish red silty clay loam. The next part, from a depth of 24 to 59 inches, is dark red, mottled clay. The lower part to a depth of 75 inches or more is mottled olive yellow, brownish yellow, dark red, and light gray clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Canmer soil but have a surface layer of sandy loam, loam, gravelly sandy loam, or gravelly loam. These soils are in landscape positions similar to those of the Canmer soil. Also included are a few areas of severely eroded Canmer soils and a few small areas of Nolichucky, Riney, and Vertrees soils.

Most areas of the Canmer soil are used for pasture or woodland. This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to limited use for row crops. Most of the commonly grown crops grow well. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage, crop residue management, and a cropping sequence that includes cover crops help to control erosion.

This soil is suited to woodland. Yellow poplar, white oak, Virginia pine, and sugar maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, eastern white pine, and shortleaf pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and

streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVE.

CnE—Canmer silt loam, 20 to 30 percent slopes.

This very deep, well drained, steep soil is on hillsides, mainly in the central and northeastern part of the county. Some areas are in landscapes characterized by karst topography. Individual areas of this soil range from about 3 to 70 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 24 inches, is brown silt loam and yellowish red silty clay loam. The next part, from a depth of 24 to 59 inches, is dark red, mottled clay. The lower part to a depth of 75 inches or more is mottled olive yellow, brownish yellow, dark red, and light gray clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Canmer soil but have a surface layer of sandy loam, loam, gravelly sandy loam, or gravelly loam. These soils are in landscape positions similar to those of the Canmer soil. Also included are some eroded areas and a few small areas of Riney and Vertrees soils.

Most areas of the Canmer soil are used as woodland. A few areas are idle land.

This soil is poorly suited to crops because of the slope. It is suited to pasture. Most of the commonly grown grasses and legumes grow well, but species that require the least amount of renovation should be selected for planting. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule. Measures that reduce the runoff rate and help to control erosion also are needed.

This soil is suited to woodland. Yellow poplar, white oak, Virginia pine, and sugar maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, eastern white pine, and shortleaf pine. The hazard of erosion, the equipment limitation, and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the slope. Low strength and the moderate shrink-swell potential also are limitations.

The capability classification is Vle.

CoD3—Canmer clay loam, 12 to 20 percent slopes, severely eroded. This very deep, well drained, moderately steep soil is on hillsides throughout the central and northeastern parts of the county. Slopes are convex. In areas characterized by karst topography, the slope varies within short distances and sinks and depressions are common. Individual areas of this soil range from about 3 to 24 acres in size. Erosion has removed most of the original surface layer and some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown clay loam about 5 inches thick. The upper part of the subsoil, from a depth of 5 to 25 inches, is yellowish red clay. The lower part to a depth of 60 inches or more is dark red, mottled clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is low. The soil is difficult to till because erosion has removed most of the original surface layer. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Canmer soil but have a surface layer of sandy loam, loam, gravelly sandy loam, or gravelly loam. Also included are a few small areas of Crider, Riney, Nolichucky, Frederick, and Vertrees soils and some areas of severely eroded Canmer soils that have slopes of 6 to 12 percent.

Most areas of the Canmer soil are used for pasture or are idle land. This soil is unsuited to cultivated crops because of the effects of past erosion and a very severe hazard of further erosion.

This soil is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. Measures that help to control further erosion are needed. Species that provide an adequate ground cover should be selected for planting. Pasture renovation, applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.

This soil is suited to woodland. Yellow poplar, white oak, Virginia pine, and sugar maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, eastern white pine, and shortleaf pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope and the clayey texture are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for

local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is Vle.

CrB2—Crider silt loam, 2 to 6 percent slopes, eroded. This very deep, well drained, gently sloping soil is on broad ridgetops throughout the county. Slopes are smooth and convex. Some areas are characterized by karst topography. Individual areas range from about 5 to 50 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is dark brown silt loam. The next part, from a depth of 14 to 30 inches, is dark yellowish brown or strong brown silt loam. The lower part to a depth of about 62 inches is yellowish red silty clay loam or red silty clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tillage is good, except in areas where erosion has exposed the subsoil material. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are a few small areas of Baxter, Vertrees, Fredonia, Frederick, and Nicholson soils. These soils are in landscape positions similar to those of the Crider soil. Also included are small areas of severely eroded Crider soils and soils in depressions that are occasionally ponded for very brief periods.

Most areas of the Crider soil are used for crops. Some areas are used as woodland or for pasture.

This soil is well suited to the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation

grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Sugar maple, black walnut, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, eastern white pine, black walnut, white ash, and loblolly pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is well suited to urban uses. The slope and the high content of clay in the lower part of the subsoil are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is on narrow ridges and hillsides throughout the county. Slopes are smooth and convex. Some areas are characterized by karst topography. Individual areas range from about 4 to 168 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is dark brown silt loam. The next part, from a depth of 14 to 30 inches, is dark yellowish brown or strong brown silt loam. The lower part to a depth of about 62 inches is yellowish red silty clay loam or red silty clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil material. The shrink-swell potential is low in the upper part of the subsoil and moderate in the lower part. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are a few small areas of Baxter, Vertrees, Fredonia, Frederick, and Nicholson soils. These soils are in landscape positions similar to those of the Crider soil. Also included are small areas of severely eroded Crider soils.

Most of the acreage of the Crider soil is used for crops. Some areas are used as woodland or for pasture.

This soil is well suited to row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a

conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Sugar maple, black walnut, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, eastern white pine, black walnut, loblolly pine, and white ash. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to urban uses. The slope and the high content of clay in the lower part of the subsoil are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

EIB—Elk silt loam, 2 to 6 percent slopes, rarely flooded. This very deep, well drained, gently sloping soil is on stream terraces throughout the county. Slopes are smooth. Individual areas range from about 4 to 20 acres in size.

Typically, the surface layer is brown silt loam about 11 inches thick. The upper part of the subsoil, from a depth of 11 to 30 inches, is yellowish brown or strong brown silt loam. The lower part to a depth of about 50 inches is dark brown silty clay loam. The substratum to a depth of about 60 inches is strong brown silty clay loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The soil is subject to rare flooding. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Allegheny, Nolichucky, Otwell, Nolin, and Lindsides soils. These soils are in landscape positions similar to those of the Elk soil. Also included are soils that are similar to the Elk soil but are not flooded.

Most areas of the Elk soil are used for crops or pasture. This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Yellow poplar, pin oak, red maple, and black walnut are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, loblolly pine, and eastern white pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The flooding is a concern on sites for most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is IIe.

FaB2—Frederick silt loam, 2 to 6 percent slopes, eroded. This very deep, well drained, gently sloping soil is on broad ridgetops and karst upland areas. Individual areas range from about 3 to 35 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 37 inches, is red clay. The lower part to a depth of 75 inches or more is red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil material. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider and Baxter soils; areas of severely eroded soils on points of ridges and on slopes surrounding

depressions; and small, isolated areas of rock outcrop and boulders.

Most areas of the Frederick soil are used for row crops and pasture. This soil is well suited to the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion and maintain tilth and organic matter content.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Black oak, yellow poplar, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar and eastern white pine. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The clayey texture and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

FaC2—Frederick silt loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is in upland areas dominated by karst topography and on short side slopes. Individual areas range from about 4 to 100 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 37 inches, is red clay. The lower part to a depth of 75 inches or more is red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil material. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Canmer, Crider, Caneyville, and Baxter soils. These soils are in landscape positions similar to those of the Frederick soil. Also included are areas of severely eroded soils, mainly around the rims of depressions, and small, isolated areas of rock outcrop, generally at the base of slopes.

Most areas of the Frederick soil have been cleared and are used for row crops and pasture. This soil is suited to the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion and maintain tilth and organic matter content.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Black oak, white oak, yellow poplar, and Virginia pine are the dominant native trees. Some of the trees preferred for planting are yellow poplar and eastern white pine. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The clayey texture, the moderate shrink-swell potential, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

FaD2—Frederick silt loam, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on karst hillsides in the eastern part of the county. Individual areas range from about 4 to 70 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 37 inches, is red clay. The lower part to a depth of 75 inches or more is red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter and the shrink-swell potential are moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Baxter, Canmer, Crider, Caneyville, and Nolichucky soils. These soils are in landscape positions similar to those of the Frederick soil. Also included are areas of severely eroded soils, mainly around the rims of depressions and on adjacent slopes between depressions, and small, isolated areas of rock outcrop, generally at the base of slopes.

Most areas of the Frederick soil are used for row crops, pasture, or hay. This soil is suited to limited use for row crops and small grain. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Black oak, yellow poplar, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar and eastern white pine. The hazard of erosion, plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the clayey texture, and the moderate shrink-swell potential are limitations. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

FaE—Frederick silt loam, 20 to 30 percent slopes. This very deep, well drained, steep soil is on hillsides and karst landscapes. The areas on steep hillsides wind around the crests of ridges and the heads of ravines. Slopes are convex. In the areas characterized by karst topography, sinks and depressions are common and slopes are irregular and vary within short distances.

Individual areas of this soil range from about 3 to 70 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 37 inches, is red clay. The lower part to a depth of 75 inches or more is red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter and the shrink-swell potential are moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Baxter and Caneyville soils. These soils are in landscape positions similar to those of the Frederick soil. Also included are small areas of Nolin soils in depressions and small, isolated areas of rock outcrop, generally at the base of slopes.

Most areas of the Frederick soil are wooded. This soil is well suited to woodland. Black oak, yellow poplar, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar and eastern white pine. Plant competition, the hazard of erosion, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to row crops because of the slope. It is suited to pasture and hay, but the slope hinders the establishment and maintenance of grasses and legumes. Most of the commonly grown grasses and legumes grow well. The hazard of erosion is very severe in disturbed areas. Species that require the least amount of renovation should be selected for planting.

This soil is poorly suited to urban uses. The slope, the clayey texture, and the moderate shrink-swell potential are limitations. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is VIe.

FcC3—Frederick silty clay loam, 6 to 12 percent slopes, severely eroded. This very deep, well drained, sloping soil is on uplands dominated by karst topography and on short side slopes. Individual areas range from about 3 to 60 acres in size. Erosion has removed most of the original surface layer and some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is yellowish red silty clay loam about 5 inches thick. The upper part of the subsoil, from a depth of 5 to 22 inches, is red silty clay. The lower part to a depth of about 61 inches is red gravelly clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is low. The soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The shrink-swell

potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Canmer, and Baxter soils. These soils are in landscape positions similar to those of the Frederick soil. Also included are small, isolated areas of rock outcrop or boulders, generally at the base of slopes, and areas of soils in slight depressions that are subject to flooding or ponding.

Most areas of the Frederick soil are used for row crops or pasture. This soil is poorly suited to the commonly grown row crops because of the effects of past erosion. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, yellow poplar, and white oak are the dominant native trees. Some of the trees preferred for planting are eastern white pine and yellow poplar. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to urban uses. The clayey texture, the moderate shrink-swell potential, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

FcD3—Frederick silty clay loam, 12 to 20 percent slopes, severely eroded. This very deep, well drained, moderately steep soil is on uplands dominated by karst topography and on hillsides. Individual areas range from about 5 to 60 acres in size. Sinks and depressions are common. Erosion has removed most of the original surface layer and some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is yellowish red silty clay loam about 5 inches thick. The upper part of the subsoil, from a depth of 5 to 22 inches, is red silty clay. The lower part to a depth of about 61 inches is red gravelly clay.

Permeability is moderate. Surface runoff is rapid. Available water capacity is high. The content of organic matter is low. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Baxter, Canmer, and Caneyville soils. These soils are in landscape positions similar to those of the Frederick soil. Also included are small, isolated areas of rock outcrop, generally at the base of slopes, and areas of soils in sinks and depressions that are subject to ponding after periods of heavy rainfall.

Most areas of the Frederick soil are used for row crops, small grain, or pasture. This soil is poorly suited to the commonly grown row crops because of the effects of past erosion. It is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, yellow poplar, and white oak are the dominant native trees. Some of the trees preferred for planting are eastern white pine and yellow poplar. Plant competition, the hazard of erosion, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The clayey texture, the moderate shrink-swell potential, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is Vle.

FdC—Fredonia-Hagerstown-Vertrees silt loams, rocky, 6 to 20 percent slopes. These moderately deep to very deep, well drained, sloping to moderately steep

soils are on ridgetops and hillsides. They are in areas characterized by karst topography, generally in limestone valleys, on toe slopes, and on foot slopes in the south-central and northwestern parts of the county. Slopes are irregular and convex. Rock outcrop makes up about 2 percent of the map unit. Individual areas of this map unit range from about 4 to 130 acres in size. The Fredonia soil makes up about 37 percent of the map unit, the Hagerstown soil about 22 percent, and the Vertrees soil about 15 percent.

Typically, the surface layer of the Fredonia soil is brown silt loam about 8 inches thick. The upper part of the subsoil is red clay about 23 inches thick, and the lower part is reddish brown clay about 2 inches thick. Limestone bedrock is at a depth of about 33 inches.

Permeability is moderately slow or slow in the Fredonia soil. Available water capacity is moderate. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to limestone bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Hagerstown soil is brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish red or red silty clay loam about 22 inches thick, and the lower part is red or reddish brown clay about 26 inches thick. Hard limestone bedrock is at a depth of about 56 inches.

Permeability is moderate in the Hagerstown soil. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is deep. The depth to bedrock ranges from 40 to 60 inches.

Typically, the surface layer of the Vertrees soil is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow in the Vertrees soil. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to hard limestone bedrock is more than 60 inches.

Included with these soils in mapping are small areas of Caneyville and Nolin soils. These included soils are in landscape positions similar to those of the major soils. Also included are areas of eroded Fredonia soils. Included soils make up about 26 percent of the map unit.

Most areas of the Fredonia, Hagerstown, and Vertrees soils are used for pasture, support second-growth trees, or are idle land.

These soils are suited to limited use for row crops and small grain. The slope and the stoniness are limitations.

These soils are well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well. The rock outcrop and the clayey texture of the surface layer are limitations affecting seedbed preparation. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

These soils are well suited to woodland. Black oak, white oak, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are Virginia pine and eastern redcedar on the Fredonia soil, eastern white pine and Virginia pine on the Hagerstown soil, and eastern white pine and white oak on the Vertrees soil. Plant competition and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

These soils are poorly suited to most urban uses. The clayey texture, the moderately slow or slow permeability, the moderate shrink-swell potential, the depth to bedrock, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soils as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

FdC3—Fredonia-Hagerstown-Vertrees complex, rocky, 6 to 20 percent slopes, severely eroded. These moderately deep to very deep, well drained, sloping to moderately steep soils are on ridgetops and hillsides. They are in areas characterized by karst topography, generally in limestone valleys and on toe slopes and foot slopes in the south-central and northwestern parts of the county. Slopes are irregular and convex. Individual areas range from about 8 to 160 acres in size. Erosion has removed most of the original surface layer and some of the subsoil. Some areas have rills and shallow gullies. The Fredonia soil makes up about 37 percent of the map unit, the Hagerstown soil about 22 percent, and the Vertrees soil about 15 percent. Rock outcrop covers as much as 2 percent of the surface.

Typically, the surface layer of the Fredonia soil is

brown silty clay loam about 6 inches thick. The upper part of the subsoil is red clay about 23 inches thick, and the lower part is reddish brown clay about 2 inches thick. Limestone bedrock is at a depth of about 31 inches.

Permeability is moderately slow or slow in the Fredonia soil. Available water capacity is moderate. The content of organic matter is low. The soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to limestone bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Hagerstown soil is brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish red or silty clay loam about 22 inches thick, and the lower part is red or reddish brown clay about 26 inches thick. Hard limestone bedrock is at a depth of about 56 inches.

Permeability is moderate in the Hagerstown soil. Available water capacity is high. The content of organic matter is low. The soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The shrink-swell potential is moderate. The root zone is deep. The depth to bedrock ranges from 40 to 60 inches.

Typically, the surface layer of the Vertrees soil is brown silty clay loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red clay.

Permeability is moderately slow in the Vertrees soil. Available water capacity is high. The content of organic matter is low. The soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The shrink-swell potential is moderate. The root zone is very deep. The depth to hard limestone bedrock is more than 60 inches.

Included with these soils in mapping are small areas of Caneyville and Nolin soils. These included soils are in landscape positions similar to those of the major soils. They make up about 24 percent of the map unit.

Most areas of the Fredonia, Hagerstown, and Vertrees soils are used for pasture, support second-growth trees, or are idle land.

These soils are poorly suited to row crops and small grain because of the effects of past erosion, the rockiness, and the slope. They are suited to hay and pasture. Most of the commonly grown grasses and legumes grow well. The rock outcrop and the clayey texture of the surface layer are limitations affecting seedbed preparation. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality

forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

These soils are suited to woodland. Eastern redcedar, white oak, and black oak are the dominant native species. Some of the trees preferred for planting are Virginia pine and eastern redcedar on the Fredonia soil and eastern white pine on the Hagerstown and Vertrees soils. The hazard of erosion, plant competition, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

These soils are poorly suited to most urban uses. The clayey texture, the moderately slow or slow permeability, the moderate shrink-swell potential, the depth to bedrock, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soils as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is VIe.

GaB—Gatton silt loam, 2 to 6 percent slopes. This very deep, gently sloping, moderately well drained soil is on broad upland ridgetops and in fan-shaped areas at the head of drainageways in the northeastern part of the county. Slopes are smooth and convex. Individual areas range from about 3 to 46 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The upper part of the subsoil, from a depth of 9 to 28 inches, is yellowish brown silt loam. The next part is a compact and brittle fragipan of yellowish brown loam about 28 inches thick. The lower part to a depth of 62 inches or more is yellowish brown, mottled clay loam.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. Tilth is good. A seasonal high water table is at a depth of 1.5 to 2.0 feet. The root zone is moderately deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Canmer, Sonora, and Nolichucky soils. These soils are in landscape positions similar to those of the Gatton soil. Also included are small areas of severely eroded Gatton soils.

Most areas of the Gatton soil are used for crops, hay, or pasture. This soil is well suited to most of the

commonly grown crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control runoff and erosion.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and a good ground cover. The seasonal high water table limits the suitability of some legumes. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Yellow poplar, white oak, and black oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, and eastern white pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slow permeability in the fragipan, wetness, and the seasonal high water table are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

Gr—Grigsby fine sandy loam, occasionally flooded. This very deep, well drained, nearly level soil is on flood plains, generally along the Green River and its tributaries and drainageways in the northern half of the county. Individual areas range from about 12 to 100 acres in size. Slopes range from 0 to 4 percent.

Typically, the surface layer is brown fine sandy loam about 9 inches thick. The subsurface layer also is brown fine sandy loam. It is about 4 inches thick. The upper part of the subsoil, from a depth of 13 to 23 inches, is yellowish brown fine sandy loam. The lower part is yellowish brown loam about 21 inches thick. The upper part of the substratum, from a depth of 44 to 61 inches, is yellowish brown, mottled loam. The lower part to a depth of about 72 inches is olive yellow, mottled fine sandy loam.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is very deep. The depth to bedrock is more than 60 inches. The soil is occasionally flooded. A seasonal high water table is

at a depth of 3.5 to 6.0 feet.

Included with this soil in mapping are small areas of Lindsides, Newark, and Nolin soils. These soils are in landscape positions similar to those of the Grigsby soil.

Most of the acreage of the Grigsby soil is used for row crops. This soil is well suited to row crops and small grain, but flooding can damage some winter crops, such as small grain.

This soil is well suited to pasture and hay. Species of grasses and legumes that can withstand flooding should be selected. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, flooding, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. American sycamore, black walnut, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, shortleaf pine, eastern white pine, and black walnut. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses because of the flooding.

The capability classification is 1lw.

HdB—Hagerstown-Fredonia-Vertrees silt loams, rocky, 2 to 6 percent slopes. These moderately deep to very deep, well drained, gently sloping soils are in irregular positions on the landscape. Individual areas range from about 4 to 75 acres in size. The Hagerstown soil makes up about 32 percent of the map unit, the Fredonia soil about 29 percent, and the Vertrees soil about 15 percent. Rock outcrop makes up less than one percent of the map unit.

Typically, the surface layer of the Hagerstown soil is brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish red or red silty clay loam about 22 inches thick, and the lower part is red or reddish brown clay about 26 inches thick. Hard limestone bedrock is at a depth of about 56 inches.

Permeability is moderate in the Hagerstown soil. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is deep. The depth to limestone bedrock ranges from 40 to 60 inches.

Typically, the surface layer of the Fredonia soil is brown silt loam about 8 inches thick. The upper part of the subsoil is red clay about 23 inches thick, and the

lower part is reddish brown clay about 2 inches thick. Limestone bedrock is at a depth of about 33 inches.

Permeability is moderately slow or slow in the Fredonia soil. Available water capacity and the content of organic matter are moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to limestone bedrock ranges from 20 to 40 inches.

Typically, the surface layer of the Vertrees soil is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow in the Vertrees soil. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate. The root zone is very deep. The depth to hard limestone bedrock is more than 60 inches.

Included with these soils in mapping are small areas of Caneyville and Nolin soils. These included soils are in landscape positions similar to those of the major soils. Also included are areas of eroded Fredonia soils. Included soils make up about 24 percent of the map unit.

Most areas of the Hagerstown, Fredonia, and Vertrees soils are used for crops or pasture. These soils are suited to the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

These soils are well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. Pasture renovation, rotation grazing, proper stocking rates, mowing for weed control, and applications of lime and fertilizer improve the quality and yields of forage.

These soils are well suited to woodland, but few areas are used for the production of timber. Northern red oak, black oak, and yellow poplar are the dominant native species. Some of the trees preferred for planting are yellow poplar, white oak, and eastern white pine on the Hagerstown soil, white oak and eastern white pine on the Fredonia soil, and yellow poplar, white ash, and northern red oak on the Vertrees soil. The equipment limitation and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This complex is suited to some urban uses. The clayey texture, the moderate shrink-swell potential, and the depth to bedrock are limitations affecting some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soils as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIs.

JfD—Jefferson-Lily-Rock outcrop complex, 12 to 20 percent slopes. These moderately steep, very deep to moderately deep, well drained, loamy soils and Rock outcrop are on hillsides throughout the western and north-central parts of the county. Slopes are complex and irregular. Individual areas range from about 5 to 250 acres in size. The Jefferson soil is on foot slopes below the steeper hillsides. The Lily soil is on the middle and upper parts of hillsides. The Jefferson soil makes up about 30 percent of this map unit, the Lily soil about 16 percent, and the Rock outcrop about 10 percent.

Typically, the surface layer of the Jefferson soil is brown fine sandy loam about 5 inches thick. The upper part of the subsoil, from a depth of 5 to 14 inches, is dark brown sandy loam. The next part, from a depth of 14 to 44 inches, is dark brown gravelly sandy loam. The lower part to a depth of about 62 inches is strong brown and dark yellowish brown loam.

Permeability is moderately rapid in the Jefferson soil. Available water capacity is high. The content of organic matter is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Typically, the surface layer of the Lily soil is dark brown loam about 3 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown loam. The next part is yellowish red sandy clay loam and sandy loam about 16 inches thick. The lower part is strong brown sandy loam about 9 inches thick. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderately rapid in the Lily soil. Available water capacity is moderate. The content of organic matter is low. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

The Rock outcrop typically occurs as scattered cliffs and bluffs formed by the exposed Big Clifty Sandstone member of the Golconda Formation. Some sandstone boulders have migrated downslope. The Rock outcrop is about 20 to 50 feet thick.

Included in mapping are small areas of shallow,

loamy soils, generally along escarpments. Also included are areas of Caneyville, Lenberg, Wellston, and Riney soils.

Most areas of this map unit are used as woodland. These soils are well suited to woodland. Chestnut oak, white oak, and shortleaf pine are the dominant native trees. Some of the trees preferred for planting are yellow poplar, shortleaf pine, and eastern white pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

These soils are poorly suited to row crops. The slope and the Rock outcrop are limitations.

These soils are poorly suited to pasture because of the slope, the Rock outcrop, and a very severe hazard of erosion. Management needs include applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

These soils are poorly suited to urban uses because of the slope, the depth to bedrock, and the Rock outcrop.

The capability classification of the Jefferson and Lily soils is IVe, and that of the Rock outcrop is VIIIs.

JfE—Jefferson-Lily-Rock outcrop complex, 20 to 30 percent slopes. These steep, very deep to moderately deep, well drained, loamy soils and Rock outcrop are on hillsides in the western and central parts of the county. Slopes are complex and irregular. Individual areas range from about 10 to more than 750 acres in size. The Jefferson soil is on benches and the lower part of hillsides. The Lily soil is on the middle and upper parts of the hillsides. The Jefferson soil makes up about 30 percent of the complex, the Lily soil about 16 percent, and the Rock outcrop about 10 percent.

Typically, the surface layer of the Jefferson soil is brown fine sandy loam about 5 inches thick. The upper part of the subsoil, from a depth of 5 to 14 inches, is dark brown sandy loam. The next part, from a depth of 14 to 44 inches, is dark brown gravelly sandy loam. The lower part to a depth of about 62 inches is strong brown and dark yellowish brown loam.

Permeability is moderately rapid in the Jefferson soil. Available water capacity is high. The content of organic matter is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Typically, the surface layer of the Lily soil is dark brown loam about 3 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown loam. The next part is yellowish red sandy clay loam and sandy loam about 16 inches thick. The

lower part is strong brown sandy loam about 9 inches thick. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderately rapid in the Lily soil. Available water capacity is moderate. The content of organic matter is low. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

The Rock outcrop typically occurs as discontinuous cliffs and bluffs formed by the exposed Big Clifty Sandstone member of the Golconda Formation. It is about 20 to 50 feet thick.

Included in mapping are small areas of shallow, loamy soils, generally along bluffs and on the upper part of hillsides. Also included are areas of Caneyville, Lenberg, Wellston, and Riney soils.

Most areas of this map unit are used as woodland. These soils are well suited to woodland. White oak, chestnut oak, and shortleaf pine are the dominant native trees. Some of the trees preferred for planting are shortleaf pine and eastern white pine. Plant competition, the hazard of erosion, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity. Using standard wheeled and tracked equipment during periods when the soils are moist results in ruts and compaction. Cable yarding systems are safer, minimize damage to the soil, and help to maintain productivity. Reforestation after harvesting should be carefully managed to control competition from undesirable understory plants.

These soils are poorly suited to row crops, to pasture, and to most urban uses because of the slope and the Rock outcrop.

The capability classification of the Jefferson and Lily soils is VIe, and that of the Rock outcrop is VIIIs.

La—Lawrence silt loam, occasionally flooded. This nearly level, somewhat poorly drained soil is on stream terraces, concave upland flats, and alluvial fans throughout the county. Individual areas range from about 4 to 19 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 28 inches, is light yellowish brown, pale brown, and yellowish brown silt loam. The next part, from a depth of 28 to 42 inches, is a very firm and compact fragipan of yellowish brown, mottled silt loam. The lower part to a depth of about 62 inches is strong brown, mottled silty clay loam.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. A seasonal high water table is at a depth of

1 to 2 feet. The root zone is only moderately deep because of the fragipan. The soil is occasionally flooded or ponded for brief periods during late winter and early spring. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Nicholson, Nolin, and Melvin soils. These soils are in landscape positions similar to those of the Lawrence soil. They make up less than 5 percent of the map unit.

Most areas of the Lawrence soil are used for row crops, hay, or pasture. Some areas are wooded.

This soil is suited to some of the commonly grown row crops. Crops may be damaged by wetness in some years. Open-ditch drainage in combination with diversions and grassed waterways can remove the excess surface water. Applying a system of conservation tillage and returning crop residue to the soil help to maintain tilth and the content of organic matter.

This soil is suited to most grasses and legumes, but it is best suited to plants that are tolerant of wetness. The fragipan restricts the growth of deep-rooted legumes. A drainage system, applications of lime and fertilizer, pasture renovation, and rotation grazing are management needs.

This soil is suited to woodland. Yellow poplar, sweetgum, and black oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, green ash, and American sycamore. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the flooding and the wetness.

The capability classification is IIIw.

LdC—Lenberg silt loam, 6 to 12 percent slopes.

This moderately deep, well drained, sloping soil is on narrow ridgetops and the upper part of hillsides in the western part of the county. Slopes are convex and irregular in shape. Individual areas range from about 4 to 18 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 4 inches thick. The subsoil is clay about 33 inches thick. It is mottled. The upper 10 inches is yellowish brown, the next 10 inches is strong brown, and the lower 13 inches is yellowish brown. Soft shale bedrock is at a depth of about 37 inches.

Permeability is moderately slow. Available water capacity is moderate. The content of organic matter is low. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to soft shale bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Caneyville, Jefferson, Lily, Tilsit, and Wellston soils.

These soils are in landscape positions similar to those of the Lenberg soil. Also included are small areas of severely eroded Lenberg soils that have a surface layer of silty clay loam.

Most areas of the Lenberg soil are used as woodland or pasture. A few areas are idle land. Some areas around Nolin River Lake are used as sites for vacation and weekend homes.

This soil is suited to most of the commonly grown row crops and small grain. The slope is the main limitation. The hazard of erosion is severe if a conventional tillage method is used. Contour farming, strip cropping, and conservation tillage help to control runoff and erosion. Tillth and the content of organic matter can be maintained by returning crop residue to the soil and including grasses and legumes in the cropping sequence.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Most areas have been cut over. White oak, hickory, black oak, and post oak are the dominant native trees. Some of the trees preferred for planting are Virginia pine, white oak, and shortleaf pine. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope, the moderately slow permeability, the clayey texture, the depth to bedrock, and the moderate shrink-swell potential are limitations affecting some sanitary facilities and some kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

LdD—Lenberg silt loam, 12 to 20 percent slopes.

This moderately deep, well drained, moderately steep soil is on hillsides in the western part of the county. Individual areas range from about 10 to 49 acres in size.

Typically, the surface layer is dark yellowish brown

silt loam about 4 inches thick. The subsoil is clay about 33 inches thick. It is mottled. The upper 10 inches is yellowish brown, the next 10 inches is strong brown, and the lower 13 inches is yellowish brown. Soft shale bedrock is at a depth of about 37 inches.

Permeability is moderately slow. Available water capacity is moderate. The content of organic matter is low. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to soft shale bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Caneyville, Jefferson, Lily, and Wellston soils. These soils are in landscape positions similar to those of the Lenberg soil. Also included are small areas of severely eroded Lenberg soils that have a surface layer of silty clay loam.

Most areas of the Lenberg soil are used as woodland or pasture. A few areas are used for row crops. Some areas around Nolin River Lake are used as sites for vacation and weekend homes.

This soil is poorly suited to the commonly grown row crops. The slope is the main limitation. The hazard of erosion is very severe if a conventional tillage method is used. Contour farming, strip cropping, and conservation tillage help to control runoff and erosion. Tillth and the content of organic matter can be maintained by returning crop residue to the soil and including grasses and legumes in the cropping sequence.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Most areas have been cut over. White oak, hickory, and chestnut oak are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, white oak, and Virginia pine. The hazard of erosion, the equipment limitation, and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the moderately slow permeability, the clayey texture, the depth to bedrock, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Also, the soil is susceptible to slippage. Low strength is a limitation on sites for local roads and streets. It also limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

LdE—Lenberg silt loam, 20 to 30 percent slopes.

This steep, moderately deep, well drained soil is on hillsides in the western part of the county. Slopes are concave and complex. Areas are dissected by many drains and rills. Individual areas range from about 10 to 70 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 4 inches thick. The subsoil is clay about 33 inches thick. It is mottled. The upper 10 inches is yellowish brown, the next 10 inches is strong brown, and the lower 13 inches is yellowish brown. Soft shale bedrock is at a depth of about 37 inches.

Permeability is moderately slow. Available water capacity is moderate. The content of organic matter is low. The shrink-swell potential is moderate. The root zone is moderately deep. The depth to soft shale bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are small areas of Caneyville, Jefferson, Lily, and Wellston soils. These soils are in landscape positions similar to those of the Lenberg soil. Also included are small areas of severely eroded Lenberg soils that have a surface layer of silty clay loam.

Most areas of the Lenberg soil are used as woodland or pasture. This soil is poorly suited to row crops and hay because of the slope. It is suited to pasture, but the slope is a limitation.

This soil is suited to woodland. White oak, hickory, chestnut oak, and post oak are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, white oak, and Virginia pine. The hazard of erosion, the equipment limitation, and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses. The slope, the moderately slow permeability, the clayey texture, and the depth to bedrock are limitations. Also, the soil is susceptible to slippage.

The capability classification is Vle.

LIB—Lily loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on ridgetops in the western and central parts of the county. Individual areas are irregular in shape and range from about 5 to 35 acres in size.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown loam. The next part is yellowish red sandy clay loam about 10 inches thick. The lower part is yellowish red and strong brown sandy loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderately rapid. Available water capacity is moderate. The content of organic matter is low. Tilth is good. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Lenberg, Wellston, Riney, and Tilsit soils. These soils are in landscape positions similar to those of the Lily soil. Also included are soils that are similar to the Lily soil but have a thin, clayey layer directly above the sandstone bedrock.

Most of the acreage of the Lily soil is used for row crops, small grain, hay, or pasture. This soil is suited to most of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and a cropping sequence that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Black oak, white oak, and shortleaf pine are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, white oak, and eastern white pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope and the depth to bedrock are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is lle.

LIC—Lily loam, 6 to 12 percent slopes. This moderately deep, well drained soil is on ridgetops and the upper part of hillsides in the western and central parts of the county. Slopes are convex and irregular in shape. Individual areas range from about 4 to 100 acres in size.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown loam. The next part is yellowish red sandy clay loam about 10 inches thick. The lower part is yellowish red

and strong brown sandy loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderately rapid. Available water capacity is moderate. The content of organic matter is low. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Wellston, Riney, Lenberg, and Tilsit soils. These soils are in landscape positions similar to those of the Lily soil. Also included are soils that are similar to the Lily soil but have a thin, clayey layer directly above the sandstone bedrock.

Most areas of the Lily soil are used for hay and pasture. Some areas are used for row crops or small grain.

This soil is suited to row crops and small grain. The slope and the depth to bedrock are limitations. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and a cropping sequence that includes grasses and legumes help to control runoff and erosion.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Black oak, white oak, and chestnut oak are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, white oak, and eastern white pine. Plant competition and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to urban uses. The depth to bedrock and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

LID—Lily loam, 12 to 20 percent slopes. This moderately deep, well drained, moderately steep soil is on hillsides in the western and central parts of the county. Slopes are convex and irregular in shape. Individual areas range from about 6 to 100 acres in size.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown loam. The next part is yellowish red sandy clay loam about 10 inches thick. The lower part is yellowish red and strong brown sandy loam about 15 inches thick. Soft sandstone bedrock is at a depth of about 39 inches.

Permeability is moderately rapid. Available water capacity is moderate. The content of organic matter is low. Tilth is good. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included with this soil in mapping are a few small areas of Wellston, Riney, and Lenberg soils. These soils are in landscape positions similar to those of the Lily soil. Also included are soils that are similar to the Lily soil but have a thin, clayey layer directly above the sandstone bedrock.

Most areas of the Lily soil are used as woodland or for hay and pasture. This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to limited use for row crops and small grain. The hazard of erosion is very severe if a conventional tillage method is used. The depth to bedrock and the slope are limitations. A system of conservation tillage and a cropping sequence that includes grasses and legumes help to control runoff and erosion.

This soil is suited to woodland. Black oak, white oak, and shortleaf pine are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, white oak, and eastern white pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The depth to bedrock and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

Ln—Lindside silt loam, occasionally flooded. This very deep, moderately well drained, nearly level soil is

on flood plains along streams and drainageways throughout the county. Individual areas range from about 5 to 100 acres in size. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is yellowish brown silt loam about 34 inches thick. It is mottled in the lower 29 inches. The substratum to a depth of about 62 inches is pale brown, mottled silt loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The soil is occasionally flooded. A seasonal high water table is at a depth of 1.5 to 3.0 feet. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are a few areas of Grigsby, Nolin, and Newark soils. These soils are in landscape positions similar to those of the Lindsides soil.

Most of the acreage of the Lindsides soil is used for cultivated crops. A few areas are used for hay, pasture, or woodland.

This soil is well suited to the commonly grown row crops. Flooding is a hazard during the winter and early spring, but row crops are generally not affected. Seedbed preparation, planting, and tillage are sometimes delayed because of excessive wetness. A system of artificial drainage is not required for most crops, but drainage can increase the time available for field operations and improve the suitability of the soil for other crops. Diversion ditches can be used to control runoff and overwash from adjacent soils. Planting cover crops and including grasses and legumes in the cropping sequence help to maintain the productivity of the soil.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. Species that can tolerate slight wetness or short periods of flooding should be selected. Overgrazing during periods when the soil is saturated can damage the plants. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. White ash, red maple, and white oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar and eastern white pine. Seedling mortality and plant competition are management concerns. See

table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the flooding and the wetness.

The capability classification is Ilw.

Me—Melvin silt loam, ponded. This very deep, poorly drained, nearly level soil is on upland flats and in depressions, mainly in the southeast corner of the county. Individual areas range from about 4 to 185 acres in size. Runoff accumulates in areas of this soil and infiltrates into underground streams.

Typically, the surface layer is grayish brown silt loam about 2 inches thick. The subsurface layer is grayish brown, mottled silt loam about 7 inches thick. The subsoil, from a depth of 9 to 32 inches, is light brownish gray, mottled silt loam. The substratum to a depth of about 86 inches is gray and light brownish gray, mottled silt loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. A seasonal high water table is commonly at or above the surface. This soil is frequently flooded and ponded, mainly during late winter and spring. The root zone is very deep, but rooting depth is restricted by the fluctuating water table. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are a few small areas of Newark and Lindsides soils. Also included are a few small areas of soils that have a more clayey texture than the Melvin soil.

Most areas of the Melvin soil are used for pasture or are idle land. This soil is suited to pasture. Species that can tolerate wetness should be selected. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, restricted grazing during wet periods, weed control, and a well planned clipping schedule.

This soil is poorly suited to cultivated crops and hay because of the wetness and the flooding.

This soil is well suited to woodland. Pin oak, red maple, and hickory are the dominant native trees. Some of the trees preferred for planting are sweetgum, pin oak, and willow oak. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses because of the flooding, the ponding, and the wetness.

The capability classification is Vw.

Nb—Newark silt loam, occasionally flooded. This very deep, somewhat poorly drained, nearly level soil is on flood plains and in depressions throughout the

county. Individual areas range from about 4 to 144 acres in size. Slopes are smooth and range from 0 to 2 percent.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is silt loam about 32 inches thick. The upper 9 inches is mottled brown and yellowish brown, the next 8 inches is light brownish gray and is mottled, and the lower 15 inches is gray and is mottled. The substratum to a depth of about 62 inches is dark gray, mottled silt loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is very deep, but rooting depth may be limited by the seasonal high water table at a depth of 0.5 foot to 1.5 feet. The soil is subject to occasional flooding. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Lindsie, Melvin, and Nolin soils. These soils are in landscape positions similar to those of the Newark soil. Also included are areas that are subject to ponding.

Areas of the Newark soil are used for crops, pasture, or woodland. This soil is suited to most row crops. The flooding and the seasonal wetness are the main limitations. Where outlets are available, surface and subsurface drainage systems are effective in reducing the wetness. In undrained areas, delaying planting or planting water-tolerant species can help to overcome the wetness. Applying a system of conservation tillage, returning crop residue to the soil, planting cover crops, and including grasses and legumes in the cropping sequence help to maintain tilth and the content of organic matter.

This soil is suited to pasture and hay, but species that can tolerate some wetness should be selected. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Pin oak, sweetgum, and green ash are the dominant native trees. Some of the trees preferred for planting are eastern cottonwood, sweetgum, and American sycamore. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the wetness and the flooding.

The capability classification is IIw.

NcB—Nicholson silt loam, 2 to 6 percent slopes.

This very deep, moderately well drained soil is on broad, gently sloping upland ridgetops, mainly in the

eastern part of the county. Slopes are convex.

Individual areas range from about 4 to 47 acres in size.

Typically, the surface layer is dark yellowish brown silt loam about 10 inches thick. The upper part of the subsoil extends to a depth of about 28 inches. It is yellowish brown silt loam that is mottled below a depth of 19 inches. The next part, from a depth of 28 to 46 inches, is a firm, brittle, and compact fragipan of yellowish brown, mottled silt loam. The lower part to a depth of about 62 inches is yellowish brown, mottled silty clay loam.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. Tilth is good. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The root zone is only moderately deep because of the fragipan. The depth to hard bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Frederick, Otwell, Vertrees, and Lawrence soils. These soils are in landscape positions similar to those of the Nicholson soil. Also included are areas of eroded and severely eroded Nicholson soils.

Most areas of the Nicholson soil are used for cultivated crops. A few areas are used for hay and pasture.

This soil is well suited to most of the commonly grown cultivated crops. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage, contour farming, terraces, and grassed waterways help to control runoff and erosion. Leaving crop residue on the surface and incorporating some of the residue into the surface layer help to maintain tilth and the content of organic matter.

This soil is well suited to hay and pasture. Most of the commonly grown grasses and legumes grow well. The seasonal high water table is a limitation affecting some legumes. The main management needs are proper stocking rates, rotation grazing, applications of lime and fertilizer, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Black oak, white oak, and hickory are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, and eastern white pine. Plant competition and the hazard of erosion are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The wetness and the slow permeability are limitations affecting most sanitary facilities. The wetness is a limitation for most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper

design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

NhB2—Nolichucky loam, 2 to 6 percent slopes, eroded. This very deep, well drained, gently sloping soil is on ridgetops and high stream terraces. Some areas are characterized by karst topography. Depressions are common, and the slope varies within short distances. Runoff drains into openings in the depressions and into underground streams. Slopes are smooth and irregular. Individual areas of this soil range from about 4 to 39 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark yellowish brown loam about 5 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 11 to 15 inches, is yellowish red loam. The next part, from a depth of 15 to 48 inches, is yellowish red, red, or dark red clay loam that is mottled in the lower 24 inches. The lower part to a depth of about 65 inches is dark red clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is low. Tilth is good. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Allegheny soils on stream terraces. Also included are areas of severely eroded Canmer soils intermingled with areas of the Nolichucky soil; Riney, Fredonia, and Caneyville soils on the rims of depressions and the lower part of hillsides; and Nolin soils in depressions and drainageways.

Most areas of the Nolichucky soil are used for cultivated crops, small grain, hay, or pasture. Some areas are used as woodland.

This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. Because of irregular slopes, erosion-control measures are difficult to apply. A system of conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and maintain tilth. Maintaining a permanent cover of vegetation in drainageways also helps to control erosion.

This soil is well suited to hay and pasture. All of the commonly grown grasses and legumes grow well. Rotation grazing, applications of lime and fertilizer, weed control, and pasture renovation are the main management needs.

This soil is well suited to woodland. Yellow poplar, southern red oak, and Virginia pine are the dominant native trees. Some of the trees preferred for planting

are yellow poplar, black walnut, white ash, eastern white pine, shortleaf pine, and loblolly pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. Low strength is a moderate limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and adequate site preparation can help to overcome this limitation in some areas.

The capability classification is IIe.

NhC2—Nolichucky loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is on ridgetops and the upper part of hillsides. Some areas are characterized by karst topography. Depressions are common, and the slope varies within short distances. Some of the runoff drains into openings in the depressions and into underground streams. Slopes are smooth and irregular. Individual areas of this soil range from about 5 to 100 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark yellowish brown loam about 5 inches thick. The subsurface layer also is dark yellowish brown loam. It is about 6 inches thick. The upper part of the subsoil, from a depth of 11 to 15 inches, is yellowish red loam. The next part, from a depth of 15 to 48 inches, is yellowish red, red, or dark red clay loam that is mottled in the lower 24 inches. The lower part to a depth of 65 inches or more is dark red clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is low. Tilth is good. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Allegheny soils on stream terraces. Also included are intermingled areas of severely eroded Nolichucky soils; Riney, Fredonia, and Caneyville soils on the rims of depressions and the lower part of hillsides; and Nolin soils in depressions and drainageways.

Most areas of the Nolichucky soil are used for cultivated crops, small grain, hay, or pasture. Some areas are used as woodland.

This soil is suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. Because of irregular slopes, some erosion-control measures are difficult to apply. A system of conservation tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion and maintain tilth. Maintaining a permanent cover of vegetation in drainageways also helps to control erosion.

This soil is well suited to hay and pasture. All of the

commonly grown grasses and legumes grow well. Rotation grazing, applications of lime and fertilizer, weed control, and pasture renovation are the main management needs.

This soil is well suited to woodland. Yellow poplar, southern red oak, and Virginia pine are the dominant native trees. Some of the trees preferred for planting are yellow poplar, eastern white pine, shortleaf pine, and loblolly pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope is a limitation affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

NhD2—Nolichucky loam, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on ridgetops, hillsides, and karst landscapes. Slopes are convex. In the areas characterized by karst topography, the slope varies within short distances. Individual areas of this soil range from about 5 to 85 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is dark yellowish brown loam about 5 inches thick. The subsurface layer is yellowish brown loam about 6 inches thick. The upper part of the subsoil, from a depth of 11 to 15 inches, is yellowish red loam. The next part, from a depth of 15 to 48 inches, is yellowish red, red, or dark red clay loam that is mottled in the lower 24 inches. The lower part to a depth of 65 inches or more is dark red clay.

Permeability is moderate. Available water capacity is high. The content of organic matter is low. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are intermingled areas of severely eroded Nolichucky soils. Also included are areas of Riney, Fredonia, and Caneyville soils on the rims of depressions and the lower part of hillsides and Nolin soils in depressions and drainageways.

Most areas of the Nolichucky soil are used for hay and pasture. Some areas are used as woodland.

This soil is suited to limited use for row crops. Most of the commonly grown crops grow well. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage, crop residue management, and a cropping sequence that includes cover crops help to control erosion.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Southern red oak, white oak, and Virginia pine are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, loblolly pine, and white oak. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the slope. Low strength is an additional limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

No—Nolin silt loam, occasionally flooded. This very deep, well drained, nearly level soil is on flood plains along streams and drainageways throughout the county. Individual areas range from 5 to 100 acres in size. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of 62 inches. It is yellowish brown silt loam and is mottled below a depth of 30 inches.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is very deep. A seasonal high water table is at a depth of 3 to 6 feet. The soil is occasionally flooded for brief periods. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Elk, Lindside, Newark, and Grigsby soils. These soils are in landscape positions similar to those of the Nolin soil.

Most of the acreage of the Nolin soil is used for row crops or small grain. A few areas are used for woodland, hay, or pasture.

This soil is well suited to all of the commonly grown row crops and small grain. Small grain cover crops may be damaged by winter flooding.

This soil is well suited to pasture and hay (fig. 13). The main management concern is siltation resulting from flooding and ponding.



Figure 13.—Round bales of hay in an area of Nolin silt loam, occasionally flooded.

This soil is well suited to woodland. Yellow poplar, black walnut, and American sycamore are the dominant native trees. Some of the trees preferred for planting are yellow poplar, sweetgum, eastern white pine, white ash, and cherrybark oak. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the flooding.

The capability classification is IIw.

Np—Nolin silt loam, depressional, frequently flooded. This very deep, well drained, nearly level soil is in depressions on karst landscapes throughout the survey area. Individual areas range from about 3 to 10 acres in size. Slope ranges from 0 to 4 percent.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of about 62 inches. It is yellowish brown silt loam and is mottled below a depth of 30 inches.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is very deep. The soil is frequently flooded or ponded after periods of heavy rainfall. A seasonal high water table is at a depth of 3 to 6 feet. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are areas of Newark, Grigsby, and Lindsides soils. These soils are in landscape positions similar to those of the Nolin soil.

Most areas of the Nolin soil are used for row crops or pasture. This soil is suited to most of the commonly grown crops. Crops may be damaged in some years by flooding or ponding. Tilth can be easily maintained by returning crop residue to the soil.

This soil is well suited to pasture and hay. The main management concerns are the flooding and the ponding.

This soil is well suited to woodland. Sweetgum, American sycamore, and eastern cottonwood are the dominant native trees. Some of the trees preferred for planting are sweetgum, eastern cottonwood, green ash, and cherrybark oak. Plant competition and seedling mortality are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the flooding and the ponding.

The capability classification is IIw.

OtA—Otwell silt loam, 0 to 2 percent slopes, rarely flooded. This very deep, moderately well drained, nearly level soil is on stream terraces throughout the county. Individual areas range from about 3 to 50 acres in size.

Typically, the surface layer is brown silt loam about

11 inches thick. The upper part of the subsoil, from a depth of 11 to 32 inches, is yellowish brown and light yellowish brown, mottled silt loam. The lower part, from a depth of 32 to 70 inches, is a very firm, compact, and brittle fragipan of yellowish brown, mottled silt loam. The substratum to a depth of about 75 inches is yellowish brown gravelly silt loam.

Permeability is moderate above the fragipan and very slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. A seasonal high water table is at a depth of 2.0 to 3.5 feet. The root zone is only moderately deep because of the fragipan. The soil is subject to rare flooding. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are soils that are similar to the Otwell soil but are in upland depressions and on flats in the southeast corner of the county from Whickerville to Three Springs and in one small area extending from north of High Hickory to the county line. Also included are small areas of Elk soils in the slightly higher elevations and small areas of Lawrence, Nolin, and Lindsides soils in low areas and narrow drainageways.

Most of the acreage of the Otwell soil is used for cultivated crops, hay, or pasture. This soil is well suited to most of the commonly grown crops and small grain. Some deep-rooted crops are affected by the wetness. Contour farming and a cropping sequence that includes grasses and legumes help to control runoff and erosion. Tilth can be easily maintained by returning crop residue to the soil and including grasses and legumes in the cropping sequence.

This soil is well suited to all of the commonly grown hay and pasture plants, except alfalfa. Species that produce adequate forage and provide a good ground cover should be selected for planting. Pasture renovation should be frequent enough to maintain the desired species. The main management needs are applications of lime and fertilizer, controlled grazing, and weed control.

This soil is well suited to woodland. White oak, yellow poplar, and sugar maple are the dominant native trees. Some of the trees preferred for planting are eastern white pine, yellow poplar, and white ash. Plant competition is a management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The flooding, the wetness, and the very slow permeability are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIw.

Pt—Pits, quarries. This map unit consists of areas where limestone bedrock has been or is being quarried and other areas where quartzite pebbles have been mined. The soil overburden and several feet of bedrock have been removed. Most of the pits have vertical walls. Individual areas range from about 5 to 65 acres in size.

The areas of this map unit have mounds of soil and broken pieces of bedrock and a few mounds of limestone that has been graded in sizes for riprap, road material, or agricultural use. Spoil piles of sandstone, shale, and limestone bedrock range from 1 inch to 3 feet in diameter. Most areas of this map unit support little or no vegetation.

Two large quarries are in the county. One is east of Aetna Furnace, and the other is in Horse Cave. Quartzite pebbles are obtained from large pits at the quarry east of Aetna Furnace. Assorted gravel and topsoil are sold from this site. The county also has several small quarries.

The capability classification is VIIIs.

RnB—Riney loam, karst, 2 to 6 percent slopes.

This very deep, well drained, gently sloping soil is on moderately wide or narrow ridgetops in the northeastern part of the county. Sinks and depressions are common. Individual areas range from about 5 to 14 acres in size.

Typically, the surface layer is yellowish brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 10 inches, is light yellowish brown loam. The next part, from a depth of 10 to 28 inches, is red clay loam. The lower part to a depth of about 43 inches is red sandy clay loam. The substratum to a depth of about 75 inches is red very gravelly sandy loam.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are some areas of Gatton, Sonora, and Canmer soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface layer and some soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches.

Most areas of the Riney soil are used for hay, pasture, or crops. This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning

crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Yellow poplar, white oak, and red maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, eastern white pine, and black walnut. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope and the depth to bedrock are the main limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

RnC2—Riney loam, karst, 6 to 12 percent slopes, eroded.

This very deep, well drained, sloping soil occurs as bands on the upper part of hillsides, at the head of drainageways, and on narrow ridgetops throughout the northeastern part of the county. Sinks and depressions are common. Slopes are convex. Individual areas range from about 4 to 140 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is yellowish brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 10 inches, is light yellowish brown loam. The next part, from a depth of 10 to 28 inches, is red clay loam. The lower part to a depth of about 43 inches is red sandy clay loam. The substratum to a depth of about 75 inches is red very gravelly sandy loam.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed part of the subsoil. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are some areas of Sonora and Canmer soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface

layer and some soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches.

Areas of the Riney soil are used for hay, pasture, crops, or woodland. Gravel pits are common in the eastern part of the county.

This soil is suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Yellow poplar, white oak, and red maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, eastern white pine, and black walnut. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope and the depth to bedrock are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

RnD2—Riney loam, karst, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on hillsides. It occurs as bands that are 150 to 700 feet wide. Sinks and depressions are common. Slopes are convex. Individual areas range from about 5 to 170 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is yellowish brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 10 inches, is light yellowish brown loam. The next part, from a depth of 10 to 28 inches, is red clay loam. The lower part to a depth of about 43 inches

is red sandy clay loam. The substratum to a depth of about 75 inches is red very gravelly sandy loam.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed part of the subsoil. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are some areas of Canmer and Frederick soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface layer and soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches.

About one-third of the acreage of the Riney soil is used for crops or pasture. The rest is used as woodland or is idle land.

This soil is suited to limited use for row crops and small grain. All of the commonly grown row crops and small grain grow well. The slope is the major limitation. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Yellow poplar, white oak, and red maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, black walnut, and eastern white pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope is the main limitation affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

RnE—Riney loam, karst, 20 to 30 percent slopes.

This very deep, well drained, steep soil occurs as bands on the lower part of hillsides and at the head of ravines in the northeastern part of the county. Sinks and depressions are common. Individual areas range from about 4 to 280 acres in size.

Typically, the surface layer is yellowish brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 10 inches, is light yellowish brown loam. The next part, from a depth of 10 to 26 inches, is red clay loam. The lower part to a depth of about 43 inches is red sandy clay loam. The substratum to a depth of about 75 inches is red very gravelly sandy loam.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are some areas of Canmer, Nolichucky, and Caneyville soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface layer and soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches.

Most areas of the Riney soil are used as woodland. This soil is poorly suited to row crops and small grain because of the slope.

This soil is suited to pasture. Most of the commonly grown grasses and legumes grow well. Species that do not require frequent renovation should be selected for planting.

This soil is well suited to woodland. Yellow poplar, white oak, and red maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, black walnut, and loblolly pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses because of the slope.

The capability classification is VIe.

RrC2—Riney loam, ridge, 6 to 12 percent slopes, eroded. This deep and very deep, well drained, sloping soil is on the upper part of ridges and hillsides in the central and western parts of the county. Slopes are convex. Most areas are cut by shallow or moderately deep drainageways. Individual areas range from about 5 to 120 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 20 inches, is red clay loam. The lower part to a

depth of about 34 inches is red sandy loam. The substratum is red sandy loam about 21 inches thick. Soft sandstone bedrock is at a depth of about 55 inches.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed part of the subsoil. The root zone is deep or very deep. The depth to bedrock is more than 48 inches.

Included with this soil in mapping are some small areas of Tilsit, Wellston, and Lily soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface layer and some soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches or have a thin layer of silt loam or silty clay loam in the upper part of the subsoil.

Most areas of the Riney soil are used for hay, pasture, or crops. This soil is suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Yellow poplar, white oak, and black oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, loblolly pine, and black walnut. Plant competition and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope and the depth to bedrock are limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

RrD2—Riney loam, ridge, 12 to 20 percent slopes, eroded. This deep and very deep, well drained, moderately steep soil occurs as bands 150 to 700 feet wide on hillsides in the central and western parts of the county. Slopes are convex. Most areas are dissected by shallow or moderately deep drainageways. Individual areas range from about 5 to 170 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown loam about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 20 inches, is red clay loam. The lower part to a depth of about 34 inches is red sandy loam. The substratum is red sandy loam about 21 inches thick. Soft sandstone bedrock is at a depth of about 55 inches.

Permeability is moderately rapid. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed part of the subsoil. The root zone is deep or very deep. The depth to bedrock is more than 48 inches.

Included with this soil in mapping are some areas of Tilsit, Wellston, Jefferson, and Lily soils. These soils are in landscape positions similar to those of the Riney soil. Also included are areas of soils that have a gravelly surface layer and some soils that are similar to the Riney soil but have soft sandstone bedrock at a depth of 25 to 40 inches or have a thin layer of silt loam or silty clay loam in the upper part of the subsoil.

About one-third of the acreage of the Riney soil is used for crops or pasture. The rest is used as woodland or is idle land.

This soil is suited to limited use for row crops and small grain. All of the commonly grown row crops and small grain grow well. The slope is the main limitation. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Yellow poplar, white oak, and black oak are the dominant native trees. Some of the trees preferred for planting are shortleaf pine, eastern white pine, and loblolly pine. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope and the depth to bedrock are the main limitations affecting most sanitary facilities and most kinds of building site development. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

RxE—Rock outcrop-Caneyville complex, 12 to 30 percent slopes. This complex consists of Rock outcrop and a moderately deep, well drained, moderately steep and steep soil on the lower part of hillsides and along the Green River and its tributaries in the central, southwestern, and northwestern parts of the county. Individual areas range from about 5 to 500 acres in size. The Rock outcrop makes up about 65 percent of this map unit and the Caneyville soil about 25 percent.

The Rock outcrop occurs as bluffs and ledges. In places, boulders have broken from the ledges and have moved downslope.

Typically, the surface layer of the Caneyville soil is brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 5 inches thick. The upper part of the subsoil, from a depth of 9 to 14 inches, is strong brown silty clay loam. The next part, from a depth of 14 to 21 inches, is yellowish red clay. The lower part is strong brown clay about 3 inches thick. Limestone bedrock is at a depth of about 24 inches.

Permeability is moderately slow in the Caneyville soil. Available water capacity and the shrink-swell potential are moderate. The content of organic matter also is moderate. The root zone is moderately deep. The depth to bedrock ranges from 20 to 40 inches.

Included in mapping are areas of Fredonia, Wallen, Bledsoe, Hagerstown, Vertrees, and Lily soils. These soils are in landscape positions similar to those of the Caneyville soil. Also included are small areas of shallow, severely eroded, clayey soils. Included soils make up about 10 percent of the map unit.

Most areas of this map unit are used as woodland or are idle land (fig. 14). This map unit is not suited to cultivated crops and is only poorly suited to hay and pasture because of the slope and the Rock outcrop. It is well suited to use as habitat for woodland wildlife.

The Caneyville soil is suited to woodland. Black oak, hickory, and scarlet oak are the dominant native trees.



Figure 14.—A wooded area of Rock outcrop-Caneyville complex, 12 to 30 percent slopes.

Some of the trees preferred for planting are yellow poplar, loblolly pine, and eastern white pine. The hazard of erosion, the equipment limitation, and plant competition are management concerns. See table 7 for specific information relating to potential productivity.

This map unit is not suited to urban uses. The depth to bedrock, the clayey texture, the slope, and the Rock outcrop are the main limitations affecting most sanitary facilities and most kinds of building site development. These limitations are difficult to overcome.

The capability classification of the Rock outcrop is

VIII₁s, and that of the Caneyville soil is VI_e.

SnB—Sonora silt loam, 2 to 6 percent slopes. This very deep, well drained, gently sloping soil is on broad, smooth, complex ridgetops in the northeastern part of the county. Individual areas of this soil range from about 3 to 105 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, from a depth of 7 to 25 inches, is strong brown silt loam. The next part, from a depth of 25 to 51 inches, is strong brown

and yellowish red clay loam that is mottled in the lower 17 inches. The lower part to a depth of about 62 inches is mottled very pale brown, strong brown, and red clay loam. The substratum to a depth of about 72 inches is very pale brown, mottled loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate in the lower part of the subsoil. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Gatton, Canmer, and Riney soils. These soils are in landscape positions similar to those of the Sonora soil. Also included are areas of eroded Sonora soils around the points of ridges.

Most areas of the Sonora soil are used for crops or pasture. This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, pasture renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Shortleaf pine, hickory, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, and white oak. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The high content of clay in the lower part of the subsoil is a limitation affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

SnC—Sonora silt loam, 6 to 12 percent slopes.

This very deep, well drained, sloping soil is on narrow ridges and the upper part of hillsides in the northeastern part of the county. Individual areas of this soil range from about 4 to 300 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, from a depth of 7 to 25 inches, is strong brown silt loam. The next part, from a depth of 25 to 51 inches, is strong brown and yellowish red clay loam that has brown mottles in the lower 17 inches. The lower part to a depth of about 62 inches is mottled very pale brown, red, and strong brown clay loam. The substratum to a depth of about 72 inches is brown, mottled loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The shrink-swell potential is moderate in the lower part of the subsoil. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Gatton, Canmer, and Riney soils. These soils are in landscape positions similar to those of the Sonora soil. Also included are small areas of severely eroded Sonora soils and small areas of soils that are similar to the Sonora soil but are along drainageways and on the upper part of slopes.

Most areas of the Sonora soil are used for pasture or crops. This soil is suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, pasture renovation, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Shortleaf pine, hickory, and yellow poplar are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, and white oak. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope and the high content of clay in the lower part of the subsoil are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

TsB—Tilsit silt loam, 2 to 6 percent slopes. This deep and very deep, moderately well drained, gently sloping soil is on moderately wide or narrow ridgetops in the western half of the county. Slopes are smooth and slightly convex. Individual areas range from about 3 to more than 50 acres in size.

Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 19 inches, is dark yellowish brown and yellowish brown silt loam. The next part, from a depth of 19 to 23 inches, is yellowish brown, mottled loam. Below this is a firm, brittle, and compact fragipan of light olive brown, mottled loam about 20 inches thick. The lower part of the subsoil to a depth of about 57 inches is mottled olive yellow, light olive brown, and dark grayish brown loam. The substratum to a depth of about 60 inches is mottled yellowish brown and grayish brown sandy loam.

Permeability is moderate above the fragipan and slow or very slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. Tilth is good. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The root zone is only moderately deep because of the fragipan. Bedrock is at a depth of 40 to 120 inches.

Included with this soil in mapping are small areas of Wellston, Lily, and Riney soils. These soils are in landscape positions similar to those of the Tilsit soil.

Most areas of the Tilsit soil are used for crops or hay. This soil is suited to all of the commonly grown row crops and small grain. The fragipan restricts drainage and root penetration. The hazard of erosion is moderate if cultivated crops are grown.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The fragipan restricts root penetration and limits production during dry seasons. The main management needs are applications of lime and fertilizer, pasture renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is suited to woodland, but few areas are used for the production of timber. Virginia pine, black oak, and southern red oak are the dominant native trees. Some of the trees preferred for planting are yellow poplar, eastern white pine, and white oak. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The wetness and the slow permeability are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for

local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is 11e.

TsC—Tilsit silt loam, 6 to 12 percent slopes. This deep and very deep, moderately well drained, sloping soil is on ridgetops in the western half of the county. Slopes are generally smooth. Individual areas range from about 3 to more than 20 acres in size.

Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 19 inches, is yellowish brown, mottled silt loam. The next layer, from a depth of 19 to 23 inches, is yellowish brown, mottled loam. Below this is a firm, brittle, and compact fragipan of light olive brown, mottled loam about 20 inches thick. The lower part of the subsoil to a depth of about 57 inches is olive yellow, light olive brown, and dark grayish brown loam. The substratum to a depth of about 60 inches is mottled yellowish brown and grayish brown sandy loam.

Permeability is moderate above the fragipan and slow or very slow in the fragipan. Available water capacity is moderate or high. The content of organic matter is moderate. Tilth is good. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The root zone is only moderately deep because of the fragipan. Bedrock is at a depth of 40 to 120 inches.

Included with this soil in mapping are areas of Wellston, Lenberg, Lily, and Riney soils. These soils are in landscape positions similar to those of the Tilsit soil.

Most areas of the Tilsit soil are used for crops or pasture. This soil is suited to all of the commonly grown row crops and small grain. The fragipan restricts drainage and root penetration. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The fragipan restricts root penetration and limits production during dry seasons. The main management needs are applications of lime and fertilizer, pasture renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is suited to woodland, but few areas are used for the production of timber. Virginia pine, hickory, and southern red oak are the dominant native trees. Some of the trees preferred for planting are yellow

poplar, eastern white pine, and white oak. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. Wetness, the slope, and the slow permeability are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is IIIe.

VrB2—Vertrees silt loam, 2 to 6 percent slopes, eroded. This very deep, well drained, gently sloping soil is on upland ridgetops in the northwestern, southern, and extreme northeastern parts of the county. Individual areas range from about 5 to 100 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Fredonia, Hagerstown, and Baxter soils. These soils are in landscape positions similar to those of the Vertrees soil. Also included are areas of severely eroded Vertrees soils and small, isolated areas of rock outcrop and boulders.

Most areas of the Vertrees soil are used for crops or pasture. This soil is suited to all of the commonly grown row crops and small grain. Erosion is a hazard if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed

control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. American elm, hickory, and sugar maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, northern red oak, and eastern white pine. Plant competition and the equipment limitation are the main management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The clayey texture, the moderately slow permeability, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

VrC2—Vertrees silt loam, 6 to 12 percent slopes, eroded. This very deep, well drained, sloping soil is on upland karst hillsides throughout the northwestern, southern, and extreme northeastern parts of the county. Individual areas range from about 5 to 165 acres in size. Sinks and depressions are common. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Fredonia, Hagerstown, Caneyville, Baxter, and Nolin soils. Also included are areas of severely eroded Vertrees soils; small, isolated areas of rock outcrop, commonly at the base of slopes; and, in the sinks and depressions, soils that are subject to flooding or ponding.

Most areas of the Vertrees soil are used for crops or pasture. This soil is suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion. Returning

crop residue to the soil increases the content of organic matter, improves fertility, minimizes crusting, and increases the rate of water infiltration.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. American elm, sugar maple, and hickory are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white oak, northern red oak, and eastern white pine. Plant competition and the equipment limitation are the main management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The clayey texture, the moderately slow permeability, the moderate shrink-swell potential, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

VrD2—Vertrees silt loam, 12 to 20 percent slopes, eroded. This very deep, well drained, moderately steep soil is on karst upland side slopes throughout the northwestern, southern, and northeastern parts of the county. Individual areas range from about 3 to 70 acres in size. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow. Available water capacity is high. The content of organic matter is moderate. Tilth is good, except in areas where erosion has exposed the subsoil. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Baxter, Crider, Hagerstown, Fredonia, and Caneyville soils. These soils are in landscape positions similar to

those of the Vertrees soil. Also included are small, isolated areas of rock outcrop, commonly at the base of slopes.

Most areas of the Vertrees soil are used for pasture, crops, or woodland. This soil is suited to limited use for row crops and small grain. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is suited to pasture and hay. All of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide an adequate ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland. Most of the wooded areas support second-growth trees. American elm, sugar maple, and hickory are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, and white oak. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses. The slope, the clayey texture, the moderately slow permeability, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

VrE—Vertrees silt loam, 20 to 30 percent slopes.

This very deep, well drained, steep soil is on upland hillsides in the northwestern, southern, and northeastern parts of the county. Individual areas range from about 4 to 160 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 12 inches, is brown silty clay loam. The next part, from a depth of 12 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 79 inches is red or dark red, mottled clay.

Permeability is moderately slow. Available water capacity is high. The content of organic matter and the shrink-swell potential are moderate. The root zone is

very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Baxter, Crider, Hagerstown, Fredonia, and Caneyville soils. These soils are in landscape positions similar to those of the Vertrees soil. Also included are small, isolated areas of rock outcrop, commonly at the base of slopes.

Most areas of the Vertrees soil are used as woodland. This soil is poorly suited to row crops because of the slope.

This soil is suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. The main management needs are proper seeding mixtures, rotation grazing, and weed control. Species that do not require frequent renovation should be selected for planting.

This soil is well suited to woodland. American elm, hickory, and sugar maple are the dominant native trees. Some of the trees preferred for planting are yellow poplar, white ash, and white oak. Plant competition, the hazard of erosion, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to urban uses. The slope, the moderately slow permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material.

The capability classification is VIe.

VtC3—Vertrees silty clay loam, 6 to 12 percent slopes, severely eroded. This very deep, well drained, sloping soil is on karst upland hillsides in the northwestern and southern parts of the county. Depressions are common. Individual areas range from about 5 to 80 acres in size. Erosion has removed 75 percent or more of the original surface layer.

Typically, the surface layer is brown silty clay loam about 3 inches thick. The upper part of the subsoil, from a depth of 3 to 20 inches, is yellowish red silty clay. The lower part to a depth of about 63 inches is dark red, mottled clay.

Permeability is moderately slow. Available water capacity is high. The content of organic matter is low. The soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The shrink-swell potential is moderate. The root zone is very deep. The depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Crider, Hagerstown, Fredonia, and Baxter soils. These soils are in landscape positions similar to those of the

Vertrees soil. Also included are small areas of Nolin soils, soils in the sinks and depressions that are subject to flooding or ponding, and a few isolated areas of rock outcrop.

Most areas of the Vertrees soil are used for crops or pasture. This soil is suited to only limited use for row crops and small grain because of the effects of past erosion. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is well suited to pasture and hay. Most of the commonly grown grasses and legumes grow well. If a pasture or hay field is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and a good ground cover. Pasture renovation should be frequent enough to maintain the desired plants. The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

This soil is suited to woodland, but few areas are used for the production of timber. White oak, eastern redcedar, and black oak are the dominant native trees. Some of the trees preferred for planting are white ash, eastern white pine, and white oak. Plant competition, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The clayey texture, the moderately slow permeability, the moderate shrink-swell potential, and the slope are limitations affecting most sanitary facilities and most kinds of building site development. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

WeB—Wellston silt loam, 2 to 6 percent slopes. This deep and very deep, well drained, gently sloping soil is on ridgetops in the western half of the county. Slopes are smooth and convex. Individual areas range from about 5 to 90 acres in size.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil to a depth of about 26 inches is yellowish brown silt loam. The next part, from a depth of 26 to 33 inches, is yellowish brown loam. The lower part to a depth of about 45 inches is strong brown clay loam. The substratum to a depth of about 62 inches is mottled yellowish brown,

red, and light yellowish brown sandy clay loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is deep or very deep. The depth to bedrock ranges from 40 to 72 inches.

Included with this soil in mapping are small areas of Tilsit, Lily, and Riney soils. These soils are in landscape positions similar to those of the Wellston soil. Also included are small areas of severely eroded Wellston soils.

Most of the acreage of the Wellston soil is used for crops. A few areas are used as pasture or woodland.

This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is moderate if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, pasture renovation, proper seeding rates and mixtures, rotation grazing, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, Virginia pine, and sugar maple are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, and eastern white pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to most urban uses. The slope, the clayey texture, and the depth to bedrock are the main limitations. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIe.

WeC—Wellston silt loam, 6 to 12 percent slopes.

This deep and very deep, well drained, sloping soil is on ridgetops and the upper part of hillsides, mainly in the western half of the county. Slopes are smooth and convex. Individual areas range from about 4 to 85 acres in size.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil to a depth of about 26 inches is yellowish brown silt loam. The next part, from a depth of 26 to 33 inches, is yellowish brown loam. The lower part to a depth of about 45 inches is strong brown clay loam. The substratum to a

depth of about 62 inches is mottled yellowish brown, red, and light yellowish brown sandy clay loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is deep or very deep. The depth to bedrock ranges from 40 to 72 inches.

Included with this soil in mapping are Tilsit, Riney, Lenberg, Lily, and Jefferson soils. These soils are in landscape positions similar to those of the Wellston soil. Also included are small areas of soils that are similar to the Wellston soil but have a surface layer of fine sandy loam.

Most of the acreage of the Wellston soil is used for crops. Some areas are used as pasture or woodland.

This soil is well suited to all of the commonly grown row crops and small grain. The hazard of erosion is severe if a conventional tillage method is used. A system of conservation tillage and crop residue management in conjunction with a conservation cropping sequence help to control erosion.

This soil is well suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, pasture renovation, proper seeding rates and mixtures, rotation grazing, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is well suited to woodland, but few areas are used for the production of timber. Black oak, Virginia pine, and sugar maple are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, and eastern white pine. Plant competition is the main management concern. See table 7 for specific information relating to potential productivity.

This soil is suited to some urban uses. The slope, the clayey texture, and the depth to bedrock are the main limitations. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IIIe.

WeD—Wellston silt loam, 12 to 20 percent slopes.

This deep and very deep, well drained, moderately steep soil is on the upper part of hillsides in the western part of the county. Slopes are smooth and convex. Individual areas range from about 4 to 69 acres in size.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil to a depth of about 26 inches is yellowish brown silt loam. The next part, from a depth of 26 to 33 inches, is yellowish brown loam. The lower part to a depth of about 45

inches is strong brown clay loam. The substratum to a depth of about 60 inches is mottled yellowish brown, red, and light yellowish brown sandy clay loam.

Permeability is moderate. Available water capacity is high. The content of organic matter is moderate. Tilth is good. The root zone is deep or very deep. The depth to bedrock ranges from 40 to 72 inches.

Included with this soil in mapping are areas of Riney, Lenberg, Lily, and Jefferson soils. These soils are in landscape positions similar to those of the Wellston soil. Also included are small areas of soils that are similar to the Wellston soil but have a surface layer of fine sandy loam.

Most of the acreage of the Wellston soil is used for pasture or woodland. This soil is suited to only limited use for row crops and small grain because of the slope. All of the commonly grown row crops and small grain grow well. The hazard of erosion is very severe if a conventional tillage method is used. A system of conservation tillage and a cropping sequence that includes grasses and legumes help to control runoff and erosion.

This soil is suited to pasture and hay. All of the commonly grown grasses and legumes grow well. The main management needs are applications of lime and fertilizer, pasture renovation, proper seeding rates and mixtures, rotation grazing, control of undesirable vegetation, and a well planned clipping and harvesting schedule.

This soil is suited to woodland. Yellow poplar, Virginia pine, and black walnut are the dominant native trees. Some of the trees preferred for planting are black walnut, yellow poplar, and eastern white pine. Plant competition, the hazard of erosion, seedling mortality, and the equipment limitation are management concerns. See table 7 for specific information relating to potential productivity.

This soil is poorly suited to most urban uses because of the slope. Low strength is a limitation on sites for local roads and streets. Also, it limits the use of the soil as roadfill material. Proper design and installation and adequate site preparation can help to overcome these limitations in some areas.

The capability classification is IVe.

Prime Farmland

In this section, prime farmland is defined and the soils in Hart County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are

permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

The map units that are considered prime farmland in Hart County are listed at the end of this section. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether the limitations have been overcome by corrective measures.

The soils identified as prime farmland in Hart County are:

AIA	Allegheny loam, 0 to 2 percent slopes, rarely flooded
AIB	Allegheny loam, 2 to 6 percent slopes, rarely flooded
BaB	Baxter gravelly silt loam, 2 to 6 percent slopes
CnB	Canmer silt loam, 2 to 6 percent slopes
CrB2	Crider silt loam, 2 to 6 percent slopes, eroded
EIB	Elk silt loam, 2 to 6 percent slopes, rarely flooded
FaB2	Frederick silt loam, 2 to 6 percent slopes, eroded
GaB	Gatton silt loam, 2 to 6 percent slopes
Gr	Grigsby fine sandy loam, occasionally flooded
La	Lawrence silt loam, occasionally flooded (where drained)
LIB	Lily loam, 2 to 6 percent slopes
Ln	Lindside silt loam, occasionally flooded
Nb	Newark silt loam, occasionally flooded (where drained)

NcB	Nicholson silt loam, 2 to 6 percent slopes	RnB	Riney loam, karst, 2 to 6 percent slopes
NhB2	Nolichucky loam, 2 to 6 percent slopes, eroded	SnB	Sonora silt loam, 2 to 6 percent slopes
No	Nolin silt loam, occasionally flooded	TsB	Tilsit silt loam, 2 to 6 percent slopes
Np	Nolin silt loam, depressional, frequently flooded (where protected from flooding or not frequently flooded during the growing season)	VrB2	Vertrees silt loam, 2 to 6 percent slopes, eroded
OtA	Otwell silt loam, 0 to 2 percent slopes, rarely flooded	WeB	Wellston silt loam, 2 to 6 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature (20).

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Gary Lillard, district conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of

land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The soils in Hart County have good potential for increased food production. About 19,000 acres of potential cropland is currently being used as woodland, and about 49,000 acres is being used as pasture (28). Food production could also be increased on current cropland by applying the latest crop production technology.

In 1987, approximately 113,000 acres in the county was used for crops and pasture (31). Of this total, 41,750 acres was harvested cropland, 54,819 acres was used for pasture, and the rest was idle cropland or pasture. The principal row crops in the county are corn and tobacco. Some soybeans also are grown. The field crops suited to the soils and climate of the county include many that are not commonly grown. For example, grain sorghum, sunflowers, and potatoes can be grown if economic conditions are favorable. Wheat is the most common close-growing crop, and a small acreage is used for oats. Rye, barley, buckwheat, and flax could be grown, and grass seed could be produced from orchardgrass, fescue, and timothy.

Alfalfa is the principal forage crop grown in the county. If properly managed, this high-quality legume thrives on the deep, well drained soils in the limestone uplands. It may also be adaptable to less favorable soils if a high level of management is applied.

The specialty crops grown in the county are vegetables and nursery crops. A small acreage is used for melons, strawberries, sweet corn, tomatoes, peppers, and small fruits.

Deep and very deep soils that have good natural drainage and that warm up early in spring are especially well suited to vegetables and fruits. Baxter and Crider

soils are examples. Crops generally can be planted and harvested earlier on these soils than on other soils in the county.

Erosion is a concern on nearly a third of the cropland and pasture in the county. It is a hazard if a soil has slopes of more than two percent.

Erosion of the surface layer is damaging because it reduces productivity, limits the depth of the root zone, and can result in the sedimentation of streams. Productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Canmer, Fredonia, and Vertrees soils. Erosion limits the depth of the root zone in soils that have a limiting layer in or below the root zone, such as Gatton, Otwell, and Tilsit soils, or in soils that are shallow or moderately deep over bedrock, such as Caneyville and Lily soils. Erosion on farmland can result in the pollution of streams. Erosion control minimizes this pollution and improves the quality of water for municipal use and recreation and for fish and wildlife.

Soils in areas characterized by karst topography, such as Baxter, Crider, Frederick, and Fredonia soils, have irregular slopes that make contour farming and terraces unfeasible. A cropping sequence that keeps a plant cover on the surface for extended periods generally can hold erosion losses to amounts that will not reduce the productivity of the soil. Alfalfa and other legumes and grasses are suitable for plant cover. On livestock farms, including perennial grasses and legumes in the cropping sequence helps to control erosion on sloping land. It also provides nitrogen and improves tilth for subsequent crops.

Minimizing tillage and leaving crop residue on the surface increase the rate of water infiltration and help to control runoff and erosion. These measures can be applied on most of the upland soils in the county.

Terraces and diversions reduce the length of slopes and thus help to control runoff and erosion. Characteristics that make the soils less suitable for terraces and diversions include irregular slopes, excessive wetness in the terrace channels, a clayey subsoil that would be exposed in terrace channels, and bedrock within a depth of 40 inches.

Contour farming and contour stripcropping are suitable erosion-control measures. They are especially effective on soils that have smooth, uniform slopes, including most areas of the gently sloping to moderately steep Allegheny, Crider, Elk, Nicholson, Nolicucky, Tilsit, Sonora, and Wellston soils.

Specific information regarding the design of erosion-control measures is available in the local office of the Soil Conservation Service.

A few soils in the county have a seasonal high water table that can affect some uses. Information regarding the management of these soils can be obtained from the local office of the Soil Conservation Service.

Many soils on uplands are very strongly acid in their natural state. In unlimed areas, applications of ground limestone are needed to raise the pH level sufficiently for optimum yields of most crops. Available phosphorus and potash levels are naturally low in most of these soils. On all soils, applications of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime to be applied and the proper method of application.

Tilth is an important factor affecting seed germination and the infiltration of water into the soil. Soils with good tilth are granular and porous.

Most of the soils in the county that are used for crops have a surface layer of silt loam that is light in color and low in content of organic matter. Generally, the structure of such soils is weak. A crust forms on the surface during periods of heavy rainfall. The crust is hard when dry and nearly impervious to water. It reduces the rate of water infiltration and increases the runoff rate. Germinating seeds have difficulty penetrating this crusted surface. Sod-based rotations or a conservation tillage system can improve soil structure and minimize crusting.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure,

and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey (24).

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them

generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w*, *s*, or *c*.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Charles A. Foster, forester, Soil Conservation Service, helped prepare this section.

About 110,700 acres in Hart County, or 41 percent of the land area, is commercial forest land (16). The dominant forest types include oak-hickory, which is on about 43 percent of the forest land; central mixed hardwoods, on about 36 percent; redcedar-hardwoods, on about 8 percent; elm-ash-cottonwood, on about 5 percent; and white oak, maple-beech, oak-pine, and southern pine, on about 8 percent.

The wooded tracts in the county are generally private holdings of about 24 acres and are essentially unmanaged. Most of the forest land can produce 50 cubic feet or more of wood per acre per year, but actual production is 38 cubic feet. The forest land is essentially unmanaged in part because 30 percent of the landowners have woodland that is only part of the farm or tract. Also, many stands are not well stocked with desirable, high-quality trees, and many tracts are owned for less than 10 years.

Tree growth, stocking, and quality can be improved by removing low-quality trees in fully stocked and understocked stands of all sizes and by regenerating

sawtimber stands after harvest. Soil surveys are useful in identifying Kentucky's most productive forest lands and the soil limitations that affect woodland management and in selecting suitable trees to plant.

The wood industry in Hart County consists mainly of three commercial sawmills and two custom mills. Wood products are rough lumber, dimension stock, posts, wood chips, pallets, crossties, and firewood. Also, several mills in adjacent counties buy logs or standing timber from Hart County.

Soils vary in their ability to produce trees. Available water capacity and depth of the root zone have major effects on tree growth. Fertility and texture also influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better than others to applications of fertilizer, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed.

The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and

maintained. A rating of moderate or severe indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The *potential productivity of common trees* on a soil is expressed as a *site index* and a *volume* number.

Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands. The estimates of the productivity of the soils in this survey are based on published data (4, 5, 6, 7, 8, 9, 11, 17, 18, 19, 21, 27).

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year calculated at the age of culmination of mean annual increment.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the

height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They

have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Gregory K. Johnson, resource specialist, Soil Conservation Service, helped prepare this section.

The principal kinds of wildlife in Hart County are cottontail rabbits, gray squirrels, fox squirrels, raccoons, opossums, skunks, red foxes, gray foxes, white-tailed deer, muskrats, bobwhite quail, and mourning doves. Many species of nongame birds and mammals also inhabit the county. The county has about 39 species of mammals, 116 species of breeding birds, and 73 species of reptiles and amphibians. Although the types of habitat required by wildlife vary, deer and squirrels generally use woodland habitat; rabbits, quail, doves, and woodcock use openland habitat; and ducks, geese, and muskrats use wetland habitat.

Photographers, bird watchers, and others are especially interested in the flora and fauna of Hart County. Several wildlife species whose ranges include Hart County have been declared endangered by the U.S. Fish and Wildlife Service. These include the Indiana bat, gray bat, Kentucky cave shrimp, rough pigtoe, pink mucket pearly mussel, fat pocketbook, and tubercled-blossom pearly mussel. The streams in the county support a variety of warm-water game fish, pan fish, and rough fish that are common throughout Kentucky. Examples of these are largemouth bass and bluegill.

Successful management of wildlife habitat requires available food, cover, and water in a suitable combination. If a tract does not have any one of these necessities or has an inadequate distribution of them, the population of the desired wildlife species can be severely reduced or eliminated. Soil information is valuable in establishing, improving, or maintaining suitable food, cover, and water for wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants (3).

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife (37). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting

soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, bluegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, aster, and cinquefoil.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of

these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Virginia pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, red fox, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development,

Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in

this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year.

They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil

through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste

is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight,

large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in

construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and

subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 21.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas (25). Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52

percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated

sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and

construction where the rate of water movement under saturated conditions affects behavior (22).

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure

and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons characteristic of soils that are not subject to flooding.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an

unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analyses of several typical pedons in the survey area are given in table 17 and the results of chemical analyses in table 18. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebraska, and the Kentucky Agricultural Experiment Station.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (29).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all materials less than 75 mm (3B1).

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (6O2), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).

Reaction (pH)—SMD buffer (Kentucky Agricultural Experiment Station).

Available phosphorus—Procedure 656 (Kentucky Agricultural Experiment Station).

Mineralogy of Selected Soils

The results of mineralogy determinations of several typical pedons are given in tables 19 and 20. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soils were analyzed by the Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebraska.

Engineering Index Test Data

Table 21 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, South National Technical Center, Soil Conservation Service, Fort Worth, Texas.

The testing methods generally are those of the

American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—

T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO); and Specific gravity (particle index)—T 100 (AASHTO), D 653 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (26). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning udic moisture regime, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalfs*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup

on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (23). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (26). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allegheny Series

The Allegheny series consists of very deep, well drained, moderately permeable soils that formed in loamy alluvium derived from acid sandstone, siltstone,

and shale. These soils are on low stream terraces throughout the county. Slopes range from 0 to 12 percent. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Allegheny soils are associated on the landscape with Elk, Grigsby, and Otwell soils. Elk and Otwell soils are in a fine-silty family. Otwell soils are moderately well drained. They have a fragipan. Grigsby soils are on flood plains. They are in a coarse-loamy family.

Typical pedon of Allegheny loam, 2 to 6 percent slopes, rarely flooded; about 1.3 miles west of the intersection of U.S. Highway 31W and Kentucky Highway 728 in Bonnieville, 1,200 feet south of Kentucky Highway 728, in a hay field; lat. 37 degrees 22 minutes 52 seconds and long. 85 degrees 55 minutes 45 seconds:

- Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; few fine roots; medium acid; gradual smooth boundary.
- AB—10 to 17 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.
- Bt1—17 to 32 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.
- Bt2—32 to 48 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; abrupt wavy boundary.
- BC—48 to 62 inches; strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; friable; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock ranges from 60 to more than 120 inches. In unlimed areas reaction ranges from extremely acid to strongly acid throughout the profile. Rounded sandstone pebbles make up 0 to 10 percent of the solum and 0 to 30 percent of the BC horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The AB horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 8. It is loam or silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. In some pedons it is mottled in shades of brown, red, or yellow in the upper part and in shades of olive or gray in the lower part. It is loam, sandy clay loam, or clay loam.

The BC horizon has hue of 10YR or 7.5YR, value of

4 to 6, and chroma of 6 to 8. In some pedons it is mottled in shades of brown, red, yellow, olive, or gray. It is clay loam, sandy clay loam, fine sandy loam, or the gravelly analogs of those textures.

Baxter Series

The Baxter series consists of very deep, well drained, moderately permeable soils that formed in material weathered from cherty limestone. These soils are on upland ridgetops and hillsides. Most areas are characterized by karst topography. Slopes range from 2 to 30 percent. The soils are fine, mixed, mesic Typic Paleudalfs.

Baxter soils are associated on the landscape with Caneyville, Crider, and Nicholson soils. Crider and Nicholson soils are in a fine-silty family. Nicholson soils are moderately well drained. They have a fragipan. Caneyville soils are moderately deep over bedrock.

Typical pedon of Baxter gravelly silt loam, 6 to 12 percent slopes, eroded; about 5.2 miles southeast of Munfordville, 0.6 mile south of the intersection of Kentucky Highway 88 and Caldwell Church Road, 1,000 feet southeast of Caldwell Church Road, in a pasture; lat. 37 degrees 15 minutes 30 seconds and long. 85 degrees 47 minutes 58 seconds:

- Ap—0 to 4 inches; brown (10YR 4/3) gravelly silt loam; weak fine and medium granular structure; friable; common fine roots; about 15 percent angular chert fragments; slightly acid; abrupt smooth boundary.
- Bt1—4 to 10 inches; yellowish red (5YR 4/6) gravelly silty clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few distinct clay films on faces of peds; about 20 percent angular chert fragments ½ inch to 6 inches in diameter; slightly acid; clear smooth boundary.
- Bt2—10 to 25 inches; dark red (2.5YR 3/6) silty clay; moderate medium and coarse subangular blocky structure parting to weak fine subangular blocky; firm; many fine roots; many prominent clay films on faces of peds; about 10 percent angular chert fragments; slightly acid; gradual wavy boundary.
- Bt3—25 to 37 inches; dark red (2.5YR 3/6) gravelly clay; moderate coarse subangular blocky structure parting to weak fine subangular blocky and angular blocky; firm; few fine roots; many prominent clay films on faces of peds; about 25 percent angular chert fragments; slightly acid; gradual smooth boundary.
- Bt4—37 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; moderate medium angular blocky structure parting to moderate fine angular blocky; firm, plastic and sticky; many prominent clay films on faces of

pedes; about 25 percent angular chert fragments as much as 3 inches in diameter; about 15 percent rock fragments ranging from 3 to more than 24 inches in diameter; very strongly acid; gradual smooth boundary.

Bt5—60 to 70 inches; dusky red (10R 3/4) gravelly clay; moderate coarse subangular blocky structure parting to moderate fine angular blocky; firm, plastic and sticky; many prominent clay films on faces of pedes; about 20 percent angular chert fragments less than 3 inches in diameter; strongly acid.

The thickness of the solum and the depth to bedrock range from 60 to more than 100 inches. The content of angular chert fragments ranges from about 10 to 30 percent in the Ap horizon. It ranges from 10 to 30 percent in the upper part of the Bt horizon and from 5 to 40 percent in the lower part. In unlimed areas reaction ranges from very strongly acid to slightly acid in the Ap horizon and is very strongly acid or strongly acid in the Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The Bt1 horizon has hue of 10YR to 2.5YR and value and chroma of 4 to 6. It is silt loam or gravelly silty clay loam in the fine-earth fraction. The Bt2, Bt3, Bt4, and Bt5 horizons have hue of 5YR to 10R, value of 3 to 5, and chroma of 4 to 6. They are silty clay or clay in the fine-earth fraction.

Some pedons have a BC or CB horizon. This horizon has colors and textures similar to those of the Bt5 horizon, but it may be mottled in shades of brown, red, yellow, or gray.

Bledsoe Series

The Bledsoe series consists of very deep, well drained, moderately slowly permeable soils that formed in loamy and clayey colluvium over material weathered from limestone, siltstone, shale, and sandstone. These soils are on foot slopes and the lower part of hillsides. Slopes range from 20 to 30 percent. The soils are fine, mixed, mesic Typic Hapludalfs.

Bledsoe soils are associated on the landscape with Wallen, Caneyville, Fredonia, Hagerstown, and Vertrees soils. Wallen soils are in a loamy-skeletal family and are moderately deep over sandstone bedrock. Caneyville and Fredonia soils are in a fine textured family and are moderately deep over limestone bedrock. Hagerstown soils are deep over limestone bedrock. Vertrees soils have a red subsoil.

Typical pedon of Bledsoe fine sandy loam, in an area of Bledsoe-Wallen-Rock outcrop complex, 20 to 30 percent slopes; about 4.0 miles northwest of the intersection of U.S. Highway 31W and Kentucky

Highway 218 in Horse Cave, 0.6 mile south of the junction of Kentucky Highway 218 and B.S. Brown Road, 1,000 feet southwest of B.S. Brown Road, 200 feet south of a farm lane, in a wooded area; lat. 37 degrees 12 minutes 34 seconds and long. 85 degrees 57 minutes 33 seconds:

Oi—½ inch to 0; leaf litter, stems, and twigs.

A—0 to 5 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many very fine, fine, and medium roots; slightly acid; gradual wavy boundary.

BA—5 to 12 inches; brown (7.5YR 4/4) loam; common medium distinct intrusions of dark brown (10YR 3/3) A material; weak fine subangular blocky structure; friable; many very fine, fine, and medium roots; slightly acid; gradual smooth boundary.

Bt1—12 to 22 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common very fine and few coarse roots; common distinct clay films on faces of pedes; about 5 percent sandstone fragments 2 millimeters to 1 inch in diameter; slightly acid; gradual smooth boundary.

2Bt2—22 to 32 inches; strong brown (7.5YR 4/6) clay; few fine distinct yellowish brown (10YR 5/6) mottles; strong medium angular blocky structure; firm; few very fine roots; many distinct clay films on faces of pedes; about 5 percent sandstone fragments; neutral; clear smooth boundary.

2Bt3—32 to 51 inches; yellowish brown (10YR 5/6) clay; common fine distinct strong brown (7.5YR 5/6) mottles; strong coarse angular blocky structure; firm; many prominent clay films and many black stains or accumulations on faces of pedes; about 5 percent sandstone fragments; neutral; gradual smooth boundary.

2BC—51 to 62 inches; mottled strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and yellowish red (5YR 5/6) clay; weak coarse angular blocky structure; very firm; many distinct clay films and many black stains or accumulations on faces of pedes; few limestone fragments; neutral.

The thickness of the solum ranges from 40 to more than 80 inches. The depth to bedrock is more than 60 inches. Reaction ranges from medium acid to mildly alkaline throughout the profile. The content of sandstone fragments or of quartz pebbles less than 2 inches in diameter ranges from 0 to 15 percent in the A, BA, and Bt1 horizons. The content of limestone and sandstone fragments ranges from 0 to 20 percent in the 2Bt2, 2Bt3, and 2BC horizons.

The A horizon has hue of 10YR, value of 3 or 4, and

chroma of 2 to 4. The BA horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. It is loam or sandy loam.

The Bt1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The 2Bt2 and 2Bt3 horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. In most pedons they are mottled in shades of brown, yellow, or red. They are clay loam, silty clay, clay, or the gravelly analogs of those textures.

The 2BC horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 8. In most pedons it is mottled in shades of brown, red, or gray. It is silty clay, clay, silty clay loam, or the gravelly analogs of those textures.

Caneyville Series

The Caneyville series consists of moderately deep, well drained, moderately slowly permeable soils that formed in material weathered from limestone. These soils are on uplands. Slopes range from 6 to 30 percent. The soils are fine, mixed, mesic Typic Hapludalfs.

Caneyville soils are associated on the landscape with Fredonia, Riney, Bledsoe, Hagerstown, and Vertrees soils. Riney, Bledsoe, and Vertrees soils are more than 60 inches deep over bedrock. Fredonia soils have a dark red Bt horizon. Hagerstown soils are more than 40 inches deep over bedrock.

Typical pedon of Caneyville silt loam, very rocky, 6 to 20 percent slopes; about 1.25 miles north of the intersection of Kentucky Highways 728 and 1140 in Priceville, 200 feet east of Kentucky Highway 1140, in a wooded area; lat. 37 degrees 23 minutes 17 seconds and long. 85 degrees 59 minutes 37 seconds:

O—2 inches to 0; leaf litter and decayed organic material.

A—0 to 4 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine roots; common medium and coarse roots; strongly acid; abrupt wavy boundary.

E—4 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; common fine roots; very strongly acid; abrupt wavy boundary.

Bt1—9 to 14 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; common distinct clay films on faces of peds; common fine roots; very strongly acid; gradual wavy boundary.

Bt2—14 to 21 inches; yellowish red (5YR 4/6) clay; strong medium subangular blocky structure; very

firm, plastic and sticky; many distinct clay films on faces of peds; medium acid; clear wavy boundary.
Bt3—21 to 24 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; very firm, plastic and sticky; many distinct clay films on faces of peds; slightly acid; abrupt wavy boundary.
R—24 inches; hard limestone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Reaction ranges from very strongly acid to neutral in the upper part of the solum and from medium acid to mildly alkaline in the lower part. The content of rock fragments ranges from 0 to 10 percent throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3. It is silt loam or silty clay loam. Pedons in severely eroded areas have an Ap horizon. This horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam. The E horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4.

The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 4 to 8. In some pedons the lower part has matrix and mottle colors in shades of brown, gray, yellow, or red. This horizon is silty clay loam, silty clay, or clay.

Some pedons have a C horizon. This horizon has matrix and mottle colors in shades of brown, gray, yellow, or red. It is silty clay or clay. Reaction ranges from slightly acid to mildly alkaline.

Canmer Series

The Canmer series consists of very deep, well drained, moderately permeable soils that formed in old alluvium or in material weathered from unconsolidated sandstone, limestone, and shale. These soils are on ridgetops and hillsides. Most areas are characterized by karst topography. Slopes range from 2 to 30 percent. The soils are clayey, mixed, mesic Typic Paleudults.

Canmer soils are associated on the landscape with Allegheny, Crider, Nolichucky, and Riney soils. Allegheny, Nolichucky, and Riney soils are in a fine-loamy family. Crider soils are in a fine-silty family.

Typical pedon of Canmer silt loam, 12 to 20 percent slopes, eroded; about 8.0 miles northeast of Munfordville, 1.2 miles east of U.S. Highway 31E on Kentucky Highway 566, about 2.2 miles south of Kentucky Highway 566 on Knox Creek Road, 700 feet west of Knox Creek Road, in a pasture; lat. 37 degrees 18 minutes 16 seconds and long. 85 degrees 45 minutes 24 seconds:

A—0 to 6 inches; brown (10YR 4/3) silt loam; moderate

fine and medium granular structure; friable; common very fine roots; about 12 percent gravel; strongly acid; clear smooth boundary.

BA—6 to 14 inches; brown (7.5YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; about 12 percent gravel; medium acid; clear smooth boundary.

Bt1—14 to 24 inches; yellowish red (5YR 5/6) silty clay loam; moderate fine and medium subangular and angular blocky structure; firm; common distinct clay films on faces of peds; about 9 percent chert fragments and gravel; few very fine roots; very strongly acid; gradual smooth boundary.

Bt2—24 to 36 inches; dark red (2.5YR 3/6) clay; common fine prominent strong brown (7.5YR 5/8) mottles; moderate coarse angular blocky structure parting to strong fine angular blocky; firm; many distinct clay films on faces of peds; about 3 percent chert fragments and pebbles; very strongly acid; gradual wavy boundary.

Bt3—36 to 59 inches; dark red (2.5YR 3/6) clay; common fine prominent yellowish red (5YR 5/6) and brownish yellow (10YR 6/6) mottles and streaks; moderate medium subangular blocky structure; firm; many distinct clay films on faces of peds; about 1 percent chert fragments; very strongly acid; gradual wavy boundary.

Bt4—59 to 75 inches; mottled olive yellow (2.5Y 6/6), brownish yellow (10YR 6/6), dark red (2.5YR 3/6), strong brown (7.5YR 5/6), and light gray (N 7/0) clay; moderate fine and medium subangular blocky structure; firm; many distinct clay films on faces of peds; less than 1 percent chert fragments; very strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. Reaction ranges from very strongly acid to neutral in the upper part of the solum and is very strongly acid or strongly acid in the lower part. The content of rock fragments, mostly sandstone cobbles, angular chert fragments, or quartzitic pebbles, ranges from 0 to about 15 percent throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is silt loam or clay loam.

The BA horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam, loam, clay loam, or sandy clay loam.

The upper part of the Bt horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 8. The lower part has hue of 2.5Y to 2.5YR, value of 3 to 5, and chroma of 4 to 8. In most pedons the Bt horizon is mottled in shades of brown, yellow, red, or gray. The

gray mottles are below a depth of 40 inches. This horizon is silty clay loam, clay loam, sandy clay, silty clay, or clay.

Crider Series

The Crider series consists of very deep, well drained, moderately permeable soils that formed in a mantle of loess over material weathered from limestone. These soils are on uplands. Some areas are characterized by karst topography. Slopes range from 2 to 12 percent but are dominantly 2 to 6 percent. The soils are fine-silty, mixed, mesic Typic Paleudalfs.

Crider soils are associated on the landscape with Baxter, Frederick, Nicholson, and Vertrees soils. Baxter and Vertrees soils are in a fine textured family. Frederick soils are in a clayey family. They have a low base saturation. Nicholson soils have a fragipan. They are moderately well drained.

Typical pedon of Crider silt loam, 2 to 6 percent slopes, eroded; about 2.75 miles east of Horse Cave, 1.3 miles west of the intersection of Uno-Horse Cave Road and Kentucky Highway 571, about 0.5 mile south of Uno-Horse Cave Road, in a pasture; lat. 37 degrees 12 minutes 44 seconds and long. 85 degrees 50 minutes 28 seconds:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; common fine roots; few black stains; slightly acid; gradual wavy boundary.

BA—9 to 14 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; few black stains; slightly acid; gradual wavy boundary.

Bt1—14 to 23 inches; dark yellowish brown (10YR 4/6) silt loam; weak fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt2—23 to 30 inches; strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt3—30 to 38 inches; yellowish red (5YR 4/8) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt4—38 to 56 inches; yellowish red (5YR 5/6) silty clay loam; common medium faint yellowish red (5YR 4/6) and few fine prominent very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay

films on faces of peds; strongly acid; gradual wavy boundary.

2Bt5—56 to 62 inches; red (2.5YR 3/6) silty clay; few fine prominent very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. Reaction ranges from strongly acid to neutral in the upper part of the solum and from very strongly acid to slightly acid in the lower part. The content of rock fragments ranges from 0 to 10 percent in the 2Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The BA horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8. In most pedons the lower part is mottled in shades of yellow, red, or brown. This horizon is silty clay, silty clay loam, or clay.

Some pedons have a 2BC horizon. This horizon has colors and textures similar to those of the 2Bt horizon.

Elk Series

The Elk series consists of very deep, well drained, moderately permeable soils that formed in mixed alluvium derived from loess and from material weathered from limestone, siltstone, shale, or sandstone. These soils are on high stream terraces. Slopes range from 2 to 6 percent. The soils are fine-silty, mixed, mesic Ultic Hapludalfs.

Elk soils are associated on the landscape with Nolin, Newark, and Otwell soils. Nolin soils are well drained. They do not have an argillic horizon. Newark soils are somewhat poorly drained. Otwell soils are moderately well drained. They have a fragipan.

Typical pedon of Elk silt loam, 2 to 6 percent slopes, rarely flooded; about 4.5 miles east of the intersection of Kentucky Highway 728 and U.S. Highway 31W in Bonnieville, 0.15 mile south on Gaddie Cemetery Road, in a cultivated field; lat. 37 degrees 24 minutes 45 seconds and long. 85 degrees 49 minutes 18 seconds:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.

BA—11 to 19 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; few fine

roots; slightly acid; gradual wavy boundary.

Bt1—19 to 24 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt2—24 to 30 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; about 2 percent chert fragments; slightly acid; gradual wavy boundary.

Bt3—30 to 50 inches; dark brown (7.5YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; about 5 percent chert fragments and pebbles; few black concretions; very strongly acid; abrupt wavy boundary.

C—50 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; massive; about 10 percent chert fragments; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock ranges from 5 to 20 feet. Reaction ranges from slightly acid to very strongly acid in the solum and from slightly acid to strongly acid in the C horizon. The content of rock fragments ranges from 0 to 5 percent in the solum and from 0 to 35 percent in the substratum.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. In most pedons it is mottled in shades of brown in the upper part and in shades of brown and gray in the lower part. It is silt loam or silty clay loam.

The C horizon has colors and textures similar to those of the Bt horizon. In some pedons it is stratified with loamy or gravelly material.

Frederick Series

The Frederick series consists of very deep, well drained, moderately permeable soils that formed in material weathered from limestone and shale. These soils are on upland ridgetops and hillsides. Slopes range from 2 to 30 percent. The soils are clayey, mixed, mesic Typic Paleudults.

Frederick soils are associated on the landscape with Crider, Caneyville, and Nicholson soils. Crider and Nicholson soils are in a fine-silty family. Nicholson soils are moderately well drained. They have a fragipan. Caneyville soils are moderately deep over bedrock.

Typical pedon of Frederick silt loam, 6 to 12 percent slopes, eroded; about 8.5 miles east of Munfordville, 0.9 mile east of the intersection of U.S. Highway 31E and Kentucky Highway 677, about 0.37 mile north of the junction of Kentucky Highway 677 and Figett Bend Road, 300 feet east of Figett Bend Road, in a pasture; lat. 37 degrees 17 minutes 50 seconds and long. 85 degrees 44 minutes 45 seconds:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure parting to moderate medium granular; friable; common fine roots; about 7 percent angular chert fragments; strongly acid; abrupt smooth boundary.

Bt1—8 to 20 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds and in root channels; about 10 percent angular chert fragments; very strongly acid; gradual smooth boundary.

Bt2—20 to 37 inches; red (2.5YR 4/6) clay; moderate coarse subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; about 12 percent angular chert fragments ½ inch to 3 inches in diameter; very strongly acid; gradual smooth boundary.

Bt3—37 to 50 inches; red (2.5YR 4/6) gravelly clay; moderate coarse subangular blocky structure parting to moderate fine subangular blocky; firm; common distinct clay films on faces of peds; about 15 percent chert fragments; very strongly acid; gradual smooth boundary.

Bt4—50 to 75 inches; red (2.5YR 4/6) gravelly clay; few fine distinct yellowish red (5YR 5/6) mottles; moderate coarse subangular blocky structure parting to moderate fine subangular blocky; firm; common distinct clay films on faces of peds; about 15 percent angular chert fragments; very strongly acid.

The thickness of the solum is more than 60 inches. The depth to bedrock ranges from 6 to 10 feet. In unlimed areas reaction ranges from very strongly acid to medium acid. The content of chert fragments ranges from 0 to 10 percent in the Ap horizon and from 0 to 15 percent in the Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

Some pedons have a BA horizon. This horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam or silty clay loam.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. In most pedons it is mottled

in shades of red, brown, or yellow in the lower part. It is silty clay, clay, or the gravelly analogs of those textures.

Fredonia Series

The Fredonia series consists of moderately deep, well drained, moderately slowly permeable or slowly permeable soils that formed in material weathered from limestone. These soils are in karst valleys and on adjacent uplands. Slopes range from 2 to 20 percent. The soils are fine, mixed, mesic Typic Hapludalfs.

Fredonia soils are associated on the landscape with Caneyville, Vertrees, and Hagerstown soils. Caneyville soils are not so red in the Bt horizon as the Fredonia soils. They typically are on steep foot slopes and on high ridges. Vertrees and Hagerstown soils are in lower positions on the landscape than the Fredonia soils. Vertrees soils are very deep over bedrock. Hagerstown soils are deep.

Typical pedon of Fredonia silt loam, in an area of Fredonia-Hagerstown-Vertrees silt loams, rocky, 6 to 20 percent slopes; about 4.0 miles northwest of the intersection of Kentucky Highway 218 and U.S. Highway 31W, in Horse Cave, 0.6 mile south of the intersection of Kentucky Highway 218 and B.S. Brown Road and 300 feet south of B.S. Brown Road, in a cultivated field; lat. 37 degrees 12 minutes 41 seconds and long. 85 degrees 57 minutes 28 seconds:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—8 to 14 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common very fine roots; common distinct clay films on faces of peds; neutral; gradual smooth boundary.

Bt2—14 to 31 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm; few very fine roots; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

BC—31 to 33 inches; reddish brown (2.5YR 4/4) clay; common fine distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; many distinct clay films on faces of peds; neutral; abrupt smooth boundary.

R—33 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. In unlimed areas reaction ranges from strongly acid to slightly acid in the upper part of the solum and from strongly acid to neutral in the lower part.

The Ap or A horizon has hue of 10YR or 7.5YR,

value of 3 or 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

The Bt horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 4 to 6. It typically is silty clay or clay, but in some pedons the upper part is silty clay loam that has hue of 7.5YR or 5YR.

The BC horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 4 to 8. It is mottled in shades of red, brown, yellow, or gray. It is silty clay or clay.

Gatton Series

The Gatton series consists of very deep, moderately well drained, slowly permeable soils that formed in a mantle of silt over unconsolidated sandstone and shale. These soils are on broad ridges. Slopes range from 2 to 6 percent. The soils are fine-loamy, mixed, mesic Typic Fragiudalfs.

Gatton soils are associated on the landscape with the well drained Riney, Sonora, and Canmer soils. Riney soils have more sand in the upper part of the Bt horizon than the Gatton soils. Sonora soils do not have a fragipan. Canmer soils are in a clayey family.

Typical pedon of Gatton silt loam, 2 to 6 percent slopes; about 1 mile north of the intersection of Kentucky Highway 936 and U.S. Highway 31E in Jonesville, 1,000 feet west of U.S. Highway 31E, about 50 feet south of Tampa Branch Road, in a cultivated field; lat. 37 degrees 24 minutes 15 seconds and long. 85 degrees 45 minutes 43 seconds:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; few wormholes and wormcasts; slightly acid; abrupt wavy boundary.

Bt1—9 to 23 inches; yellowish brown (10YR 5/6) silt loam; dark brown (10YR 4/3) intrusions of Ap material; weak fine and medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; few wormholes and wormcasts; neutral; gradual wavy boundary.

Bt2—23 to 28 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure parting to weak fine subangular blocky; friable; few fine roots; common distinct clay films on faces of peds; medium acid; abrupt wavy boundary.

2Btx1—28 to 38 inches; yellowish brown (10YR 5/4) loam; common medium distinct reddish yellow (7.5YR 6/6) and gray (10YR 6/1) mottles; moderate very coarse prismatic structure parting to moderate very thick platy; very firm, brittle, and compact; few roots between prisms; common distinct clay films on faces of peds; strongly acid; clear wavy boundary.

2Btx2—38 to 56 inches; yellowish brown (10YR 5/6)

loam; common medium distinct reddish yellow (7.5YR 4/6) and light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, brittle, and compact; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

3Bt—56 to 62 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct brownish yellow (10YR 6/8) and gray (10YR 6/1) mottles; moderate thin platy structure; very firm; common distinct clay films on faces of peds; strongly acid.

The solum is more than 60 inches thick. The depth to bedrock is more than 5 feet. In unlimed areas reaction is strongly acid or very strongly acid throughout the profile. The content of rock fragments ranges from 0 to 5 percent in the lower part of the solum.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. In some pedons it is mottled in shades of brown, red, or gray in the lower part. It is silt loam or silty clay loam.

The 2Btx horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. It is mottled in shades of brown, red, or gray. It is fine sandy loam, loam, or sandy clay loam.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 4 to 8. It is mottled in shades of red, brown, or gray. It is clay, sandy clay, or clay loam.

Grigsby Series

The Grigsby series consists of very deep, well drained, moderately rapidly permeable soils that formed in mixed alluvium. These soils are on flood plains. Slopes range from 0 to 4 percent. The soils are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

The Grigsby soils in this survey area are taxadjuncts to the series because they have siliceous mineralogy. Also, the content of clay is higher than is defined as the range for the series, although it is within the range defined for a coarse-loamy family.

Grigsby soils are associated on the landscape with Elk, Newark, and Nolin soils. Elk, Newark, and Nolin soils are in a fine-silty family. Elk soils are on terraces. Newark soils are somewhat poorly drained.

Typical pedon of Grigsby fine sandy loam, occasionally flooded; about 10.0 miles north of Munfordville, 1.7 miles southwest of Hammonville, 1.5 miles west of the intersection of Kentucky Highways 357 and 728, about 0.2 mile south of Kentucky Highway 728, in a cultivated field; lat. 37 degrees 23 minutes 51

seconds and long. 85 degrees 49 minutes 52 seconds:

- Ap—0 to 9 inches; brown (10YR 4/3) fine sandy loam; weak coarse angular blocky structure parting to weak fine granular; very friable; few fine roots; pockets of pale brown (10YR 6/3) sand; slightly acid; abrupt smooth boundary.
- A—9 to 13 inches; brown (10YR 4/3) fine sandy loam; weak coarse and medium subangular blocky structure parting to strong fine granular; friable; few fine roots; less than 1 percent pebbles; slightly acid; clear smooth boundary.
- Bw1—13 to 23 inches; yellowish brown (10YR 5/6) fine sandy loam; moderate coarse subangular blocky structure parting to weak fine granular; friable; few fine roots; less than 1 percent pebbles; slightly acid; gradual smooth boundary.
- Bw2—23 to 33 inches; yellowish brown (10YR 5/6) loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; about 1 percent pebbles; medium acid; gradual smooth boundary.
- Bw3—33 to 44 inches; yellowish brown (10YR 5/6) loam; moderate coarse subangular blocky structure; friable; few faint strong brown (7.5YR 5/6) clay films; few fine rounded brown concretions; medium acid; gradual wavy boundary.
- CB—44 to 61 inches; yellowish brown (10YR 5/6) loam; common fine distinct strong brown (7.5YR 5/6) and prominent light brownish gray (2.5YR 6/2) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; brown stains on faces of peds; very strongly acid; gradual wavy boundary.
- C—61 to 72 inches; olive yellow (10YR 6/6) fine sandy loam; common medium faint yellowish brown (10YR 5/6) and few fine prominent light brownish gray (2.5Y 6/2) mottles; massive; firm; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. Reaction ranges from medium acid to neutral in the upper 40 inches and from very strongly acid to neutral below a depth of 40 inches. The content of rock fragments ranges from 0 to about 15 percent in the A and B horizons and from 0 to 60 percent in the C horizon.

The Ap and A horizons have hue of 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has pale brown mottles below a depth of 24 inches. It is fine sandy loam, sandy loam, or loam.

The CB and C horizons have hue of 10YR or 7.5YR,

value of 4 to 6, and chroma of 3 to 6. They are loam, fine sandy loam, sandy loam, loamy fine sand, or the gravelly or very gravelly analogs of those textures.

Hagerstown Series

The Hagerstown series consists of deep, well drained, moderately permeable soils in karst limestone valleys. These soils formed in limestone residuum. Slopes range from 2 to 20 percent. The soils are fine, mixed, mesic Typic Hapludalfs.

Hagerstown soils are associated on the landscape with Vertrees and Fredonia soils. Vertrees soils are more than 60 inches deep over bedrock. Fredonia soils are 20 to 40 inches deep over bedrock. They are generally in higher positions on the landscape than the Hagerstown soils.

Typical pedon of Hagerstown silt loam, in an area of Hagerstown-Fredonia-Vertrees silt loams, rocky, 2 to 6 percent slopes; about 2.6 miles northwest of the intersection of Kentucky Highway 218 and U.S. Highway 31W in Horse Cave, 0.7 mile north of the intersection of Kentucky Highway 218 and Fisher Ridge Road, 0.3 mile west on gravel lane, 75 feet west of lane, in a cultivated field; lat. 37 degrees 12 minutes 47 seconds and long. 85 degrees 56 minutes 17 seconds:

- Ap—0 to 8 inches; brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; very friable; few very fine roots; neutral; clear smooth boundary.
- Bt1—8 to 15 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common distinct reddish brown (5YR 4/4) clay films and common fine prominent black (N 2/0) stains on faces of peds; neutral; gradual smooth boundary.
- Bt2—15 to 30 inches; red (2.5YR 4/8) silty clay loam; moderate medium subangular blocky structure; firm; many distinct red (2.5YR 4/6) clay films on faces of peds; common fine black (N 2/0) nodules; medium acid; gradual smooth boundary.
- Bt3—30 to 53 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm; common distinct dark red (2.5YR 3/6) clay films and few distinct black (N 2/0) stains on faces of peds; common fine black (N 2/0) nodules; strongly acid; clear smooth boundary.
- BC—53 to 56 inches; reddish brown (5YR 4/4) clay; common fine prominent red (2.5YR 4/8) mottles; strong medium angular blocky structure; very firm; common prominent red (2.5YR 4/6) clay films on faces of peds; less than 1 inch of dark grayish brown (10YR 4/2) clay directly above the bedrock; neutral; abrupt smooth boundary.

R—56 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. In unlimed areas reaction ranges from strongly acid to slightly acid in the upper part of the solum and from strongly acid to neutral in the lower part. The content of coarse fragments is commonly less than 15 percent throughout the solum. In some pedons the lower part of the B horizon has as much as 5 percent stone-sized limestone fragments.

The Ap horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 to 5, and chroma of 2 to 4.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, clay, or silty clay.

The BC horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 8. It is clay or silty clay. Some pedons do not have a BC horizon.

Jefferson Series

The Jefferson series consists of very deep, well drained, moderately rapidly permeable soils that formed in colluvium derived from acid sandstone, shale, and siltstone. These soils are on hillsides. Slopes range from 12 to 30 percent. The soils are fine-loamy, siliceous, mesic Typic Hapludults.

Jefferson soils are associated on the landscape with Caneyville, Lily, and Riney soils. Caneyville and Lily soils are less than 40 inches deep over bedrock. Caneyville soils are in a fine textured family. Riney soils have a red Bt horizon. They formed in residuum.

Typical pedon of Jefferson fine sandy loam, in an area of Jefferson-Lily-Rock outcrop complex, 20 to 30 percent slopes; about 3 miles northwest of Bonnieville, 200 feet north of the intersection of Kentucky Highway 1656 and Wright Lane, 800 feet east of Kentucky Highway 1656, in a wooded area; lat. 37 degrees 24 minutes 42 seconds and long. 85 degrees 56 minutes 06 seconds:

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; few fine roots; about 2 percent sandstone fragments; strongly acid; clear smooth boundary.

Bt1—5 to 14 inches; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; friable; few fine roots; about 2 percent sandstone fragments; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—14 to 44 inches; dark brown (7.5YR 4/4) gravelly sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few faint clay films and

black stains on faces of peds; about 15 percent sandstone fragments as much as 10 inches in diameter; strongly acid; gradual wavy boundary.

Bt3—44 to 52 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; about 5 percent sandstone fragments; very strongly acid; gradual wavy boundary.

BC—52 to 62 inches; dark yellowish brown (10YR 4/6) loam; weak medium subangular blocky structure; friable; about 5 percent sandstone fragments; very strongly acid.

The thickness of the solum ranges from 40 to 70 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 2 to 35 percent. In unlimed areas reaction is very strongly acid or strongly acid throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. Most pedons are mottled in shades of brown, yellow, or red, but in some pedons the lower part is mottled in shades of gray. This horizon is loam, sandy loam, sandy clay loam, clay loam, or the gravelly analogs of those textures.

The BC horizon has colors in shades of red, brown, or gray. In some pedons it is mottled. It is loam, sandy loam, fine sandy loam, sandy clay loam, clay loam, or the gravelly analogs of those textures.

Some pedons have a C horizon, which has colors and textures similar to those of the BC horizon.

Lawrence Series

The Lawrence series consists of very deep, somewhat poorly drained soils that have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. These soils formed mainly in mixed alluvium. In a few areas they formed in loess and in the underlying material weathered from limestone, sandstone, or shale. They are on stream terraces, on alluvial fans, and in depressions on upland flats. Slopes range from 0 to 2 percent. The soils are fine-silty, mixed, mesic Aquic Fragiudalfs.

Lawrence soils are associated on the landscape with Melvin, Nicholson, and Nolin soils. Melvin soils are poorly drained and are on flood plains. Nicholson soils are moderately well drained. Nolin soils are well drained and are on flood plains.

Typical pedon of Lawrence silt loam, occasionally flooded; about 3.0 miles east of Linwood, 0.5 mile south of the intersection of Bennett Road and Kentucky Highway 566, about 150 feet west of Kentucky Highway

566, in a cultivated field; lat. 37 degrees 18 minutes 57 seconds and long. 85 degrees 42 minutes 39 seconds:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; few fine faint pale brown mottles; weak fine granular structure; very friable; few fine roots; neutral; abrupt wavy boundary.

BA—8 to 14 inches; light yellowish brown (10YR 6/4) silt loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; very friable; few fine roots; few black and brown stains and concretions; neutral; gradual wavy boundary.

Bt1—14 to 18 inches; pale brown (10YR 6/3) silt loam; few fine distinct yellowish brown (10YR 5/8) and light gray (2.5Y 7/2) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—18 to 28 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; very strongly acid; abrupt wavy boundary.

Btx—28 to 42 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light yellowish brown (10YR 6/4) and light gray (10YR 7/2) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm and brittle; few faint clay films on faces of peds; very strongly acid; abrupt wavy boundary.

BC—42 to 62 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm; few small gravel fragments; very strongly acid.

The thickness of the solum ranges from 40 to 70 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction ranges from very strongly acid to slightly acid above the fragipan, is very strongly acid or strongly acid in the fragipan, and ranges from very strongly acid to neutral in the BC horizon.

The Ap horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. The BA horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 3 to 6. In most pedons it is mottled in shades of brown. It is silt loam or silty clay loam.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 3 to 6. It has few or common mottles in shades of gray and brown. It is silt loam or silty clay loam.

The Btx horizon has hue of 5Y to 7.5YR, value of 4 to 6, and chroma of 1 to 8. It is mottled in shades of gray and brown. It is silt loam or silty clay loam.

The BC horizon has hue of 5Y to 5YR, value of 4 to 6, and chroma of 1 to 8, or it is neutral in hue and has value of 5 to 7. It ranges from silt loam to clay.

Lenberg Series

The Lenberg series consists of moderately deep, well drained, moderately slowly permeable soils that formed in material weathered from acid clay shale. These soils are generally interbedded with thin strata of siltstone or sandstone. They are on ridgetops and hillsides. Slopes range from 6 to 30 percent. The soils are fine, mixed, mesic Ultic Hapludalfs.

Lenberg soils are associated on the landscape with Tilsit, Lily, Wellston, Caneyville, and Jefferson soils. Lily and Jefferson soils are in a fine-loamy family. Jefferson soils are very deep over bedrock. Wellston soils are in a fine-silty family. They are deep over bedrock. Caneyville soils are underlain by hard limestone bedrock. Tilsit soils have a fragipan. They are moderately well drained.

Typical pedon of Lenberg silt loam, 20 to 30 percent slopes; about 13 miles west of Munfordville, 1 mile southwest of the intersection of Kentucky Highways 88 and 1015, about 410 feet north of Kentucky Highway 1015, about 25 feet south of a dirt road, in a wooded area; lat. 37 degrees 19 minutes 00 seconds and long. 86 degrees 08 minutes 27 seconds:

A—0 to 4 inches; dark yellowish brown (10YR 4/4) silt loam; weak very fine granular structure; friable; few fine roots; slightly acid; abrupt wavy boundary.

Bt1—4 to 14 inches; yellowish brown (10YR 5/6) clay; common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—14 to 24 inches; strong brown (7.5YR 5/6) clay; common fine distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; few sandstone fragments; very strongly acid; clear wavy boundary.

Bt3—24 to 37 inches; yellowish brown (10YR 5/6) clay; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; very firm; common distinct clay films on faces of peds; strongly acid; clear wavy boundary.

Cr—37 to 40 inches; soft shale bedrock.

The thickness of the solum and the depth to soft

shale bedrock range from 20 to 40 inches. In unlimed areas reaction is very strongly acid or strongly acid throughout the profile. The content of sandstone, siltstone, and shale fragments ranges from 0 to 20 percent in the solum. The fragments are mostly ½ inch to 6 inches in diameter.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Some pedons have a BA horizon. This horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. It is silt loam, silty clay loam, or silty clay.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 8. It is mottled in shades of brown, red, or yellow in the upper part and in shades of gray in the lower part. It is silty clay, clay, or silty clay loam.

Some pedons have a C horizon. This horizon has mottles or matrix colors in shades of red, brown, yellow, olive, or gray. It is silty clay, clay, or the gravelly or channery analogs of those textures. The content of sandstone, siltstone, or shale fragments ranges from 5 to 60 percent. The fragments are mostly ½ inch to 6 inches in diameter.

Lily Series

The Lily series consists of moderately deep, well drained, moderately rapidly permeable soils that formed in material weathered from soft sandstone. These soils are on ridgetops and the upper part of hillsides throughout the county. Slopes range from 6 to 30 percent. The soils are fine-loamy, siliceous, mesic Typic Hapludults.

Lily soils are associated on the landscape with Wellston, Riney, and Jefferson soils. Wellston soils are in a fine-silty family. They are deep over bedrock. Riney and Jefferson soils are very deep over bedrock.

Typical pedon of Lily loam, 6 to 12 percent slopes; about 5.0 miles north of Munfordville, 1.0 mile east of the intersection of U.S. Highway 31W and Kentucky Highway 728, south on Kentucky Highway 2754, about 0.5 mile south of the intersection of Chestnut Grove Road and Frenchman Knob Road, in a roadcut on the east side of Chestnut Grove Road, in a wooded area; lat. 37 degrees 21 minutes 12 seconds and long. 85 degrees 53 minutes 45 seconds:

A—0 to 3 inches; dark brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

AB—3 to 9 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; many

medium and few coarse roots; medium acid; clear smooth boundary.

Bt1—9 to 14 inches; strong brown (7.5YR 5/6) loam; moderate fine subangular and angular blocky structure; friable; many fine and medium roots; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt2—14 to 24 inches; yellowish red (5YR 5/6) sandy clay loam; moderate fine and medium angular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; about 8 percent sandstone fragments; strongly acid; gradual wavy boundary.

2Bt3—24 to 30 inches; yellowish red (5YR 5/8) sandy loam; weak fine angular and subangular blocky structure; friable; few medium roots; few faint clay films on faces of peds; about 6 percent sandstone fragments; strongly acid; gradual wavy boundary.

2BC—30 to 39 inches; strong brown (7.5YR 5/6) sandy loam; weak thick platy structure; firm; few medium roots; about 3 percent sandstone fragments; medium acid; clear wavy boundary.

2Cr—39 to 52 inches; soft sandstone bedrock.

The thickness of the solum and the depth to soft sandstone bedrock range from 20 to 40 inches. In unlimed areas reaction ranges from extremely acid to medium acid throughout the profile. The content of weathered sandstone fragments ranges from 0 to 10 percent to a depth of about 24 inches and from 0 to 35 percent below this depth.

The A and AB horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. The AB horizon is loam, fine sandy loam, or sandy loam.

The Bt horizon has hue of 7.5YR, 10YR, or 5YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The 2Bt horizon has hue of 7.5YR or 5YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy loam, sandy clay loam, or clay loam.

The 2BC horizon and the 2C horizon, if it occurs, have colors similar to those of the 2Bt horizon. In some pedons they are mottled in shades of red, brown, olive, yellow, or gray. They are fine sandy loam, sandy loam, sandy clay loam, clay loam, or the gravelly analogs of those textures.

Lindside Series

The Lindside series consists of very deep, moderately well drained, moderately permeable soils that formed in mixed alluvium on flood plains. Slopes range from 0 to 2 percent. The soils are fine-silty,

mixed, mesic Fluvaquentic Eutrochrepts.

Lindside soils are associated on the landscape with Melvin, Newark, and Nolin soils. Melvin soils are poorly drained, Newark soils are somewhat poorly drained, and Nolin soils are well drained.

Typical pedon of Lindside silt loam, occasionally flooded; about 3.5 miles east of Linwood, 0.56 mile south of the junction of Kentucky Highway 566 and Bennett Road, 0.26 mile south of Kentucky Highway 566, in a corn field; lat. 37 degrees 18 minutes 28 seconds and long. 85 degrees 42 minutes 43 seconds:

- Ap—0 to 9 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.
- BA—9 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; gradual wavy boundary.
- Bw1—14 to 24 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.
- Bw2—24 to 43 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.
- C—43 to 62 inches; pale brown (10YR 6/3) silt loam; few fine faint light brownish gray mottles; massive; firm; few brown stains on faces of peds; medium acid.

The thickness of the solum ranges from 25 to 50 inches. The depth to bedrock is more than 60 inches. Reaction ranges from strongly acid to mildly alkaline in the upper part of the profile and from medium acid to mildly alkaline in the lower part. The content of rock fragments ranges from 0 to 5 percent to a depth of 40 inches and from 0 to 15 percent below this depth.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is mottled in shades of gray and brown. It is silt loam, silty clay loam, or very fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam, silty clay loam, or loam.

Melvin Series

The Melvin series consists of very deep, poorly drained, moderately permeable soils that formed in mixed alluvium on flood plains. Slopes range from 0 to 2 percent. The soils are fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

Melvin soils are associated on the landscape with Lindside, Newark, Otwell, and Nolin soils. Lindside, Newark, and Nolin soils are better drained than the Melvin soils. Otwell soils are moderately well drained and have a fragipan. They are in higher positions on the landscape than the Melvin soils.

Typical pedon of Melvin silt loam, ponded; 11.5 miles southwest of Munfordville, 0.7 mile south of the intersection of Kentucky Highway 677 and J.C. Jones Road, in a pasture; lat. 37 degrees 11 minutes 30 seconds and long. 85 degrees 41 minutes 55 seconds:

- A—0 to 2 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; many very fine and common fine roots; slightly acid; clear smooth boundary.
- E—2 to 9 inches; grayish brown (2.5Y 5/2) silt loam; common fine prominent strong brown (7.5YR 4/6) mottles; weak fine and medium granular structure; friable; many fine and few coarse roots; slightly acid; abrupt smooth boundary.
- Bg—9 to 32 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; few medium and common fine roots; common pores; medium acid; gradual wavy boundary.
- Cg1—32 to 55 inches; gray (10YR 6/1) silt loam; common fine prominent brownish yellow (10YR 6/8) and light yellowish brown (2.5Y 6/4) mottles; massive; firm; few fine roots; few pores; slightly acid; abrupt wavy boundary.
- Cg2—55 to 86 inches; light brownish gray (2.5Y 6/2) silt loam; few fine distinct gray (N 6/0) and common fine prominent yellowish brown (10YR 5/8) mottles; massive; firm; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. Reaction ranges from medium acid to mildly alkaline throughout the profile.

The A and E horizons have hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. The E horizon is mottled in shades of brown and red.

The Bg horizon has hue of 10YR to 5Y, value of 4 to

7, and chroma of 2 or less. It is mottled in shades of brown and red. It is silt loam or silty clay loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or less. It is mottled in shades of brown, olive, and gray. It is silt loam or silty clay loam. In some pedons it has strata of loam or silty clay below a depth of 40 inches.

Newark Series

The Newark series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in mixed alluvium derived mostly from limestone. These soils are on flood plains along the major streams and their tributaries and in depressions in areas characterized by karst topography. Slopes range from 0 to 2 percent. The soils are fine-silty, mixed, nonacid, mesic Aeric Fluvaquents.

Newark soils are associated on the landscape with Grigsby, Lindsides, Melvin, and Nolin soils. Grigsby, Lindsides, and Nolin soils are better drained than the Newark soils. Melvin soils are poorly drained.

Typical pedon of Newark silt loam, occasionally flooded; about 3.3 miles south of Magnolia, 0.5 mile west of Kentucky Highway 1079, about 50 feet north of Brushy Fork, in a hay field; lat. 37 degrees 23 minutes 24 seconds and long. 85 degrees 43 minutes 18 seconds:

Ap—0 to 10 inches; dark brown (7.5YR 4/4) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak fine granular structure; friable; few fine roots; few black and brown stains; neutral; gradual wavy boundary.

Bw—10 to 19 inches; mottled brown (10YR 5/3), yellowish brown (10YR 5/4), and dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; firm; few fine roots; many black stains on faces of peds; neutral; gradual wavy boundary.

Bg1—19 to 27 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak subangular blocky structure; friable; few fine roots; many brown stains on faces of peds; neutral; gradual wavy boundary.

Bg2—27 to 42 inches; gray (10YR 5/1) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; firm; few black concretions; neutral; gradual wavy boundary.

Cg—42 to 62 inches; dark gray (10YR 4/1) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; massive; firm; few fine roots; many black and brown concretions; slightly acid.

The thickness of the solum ranges from 22 to 45

inches. The depth to bedrock is more than 60 inches. Reaction ranges from medium acid to mildly alkaline throughout the profile. The content of rock fragments ranges from 0 to 20 percent in the substratum.

The Ap and Bw horizons have hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. They are mottled in shades of brown and gray.

The Bg1 horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is mottled in shades of brown and gray. It is silt loam or silty clay loam.

The Bg2 horizon has hue of 2.5Y to 7.5YR or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 2. It is mottled in shades of brown. It is silt loam or silty clay loam.

Some pedons have a BC horizon. The BC and Cg horizons have colors and textures similar to those of the Bg2 horizon.

Nicholson Series

The Nicholson series consists of very deep, moderately well drained soils that have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. These soils formed in a mantle of loess or silty material underlain by material weathered from limestone, calcareous shale, and siltstone. They are on broad ridgetops. Slopes range from 2 to 6 percent. The soils are fine-silty, mixed, mesic Typic Fragiudalfs.

Nicholson soils are associated on the landscape with Baxter, Crider, Vertrees, and Frederick soils. Baxter soils are gravelly and are in a fine textured family. Crider soils do not have a fragipan. Frederick and Vertrees soils have a red subsoil. Frederick soils are in a clayey family. Vertrees soils are in a fine textured family.

Typical pedon of Nicholson silt loam, 2 to 6 percent slopes; about 1.5 miles south of the intersection of Kentucky Highways 88 and 677 in Monroe, 50 feet east of Whickerville Road, in a pasture; lat. 37 degrees 12 minutes 36 seconds and long. 85 degrees 41 minutes 45 seconds:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; common fine roots; few small chert and siltstone fragments; neutral; abrupt wavy boundary.

Bt1—10 to 19 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; few distinct clay films; slightly acid; gradual wavy boundary.

Bt2—19 to 28 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct pale brown (10YR 6/3) and light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure;

friable; common fine roots; few distinct clay films on faces of peds; few brown concretions; slightly acid; abrupt wavy boundary.

Btx—28 to 46 inches; yellowish brown (10YR 5/4) silt loam; common fine faint pale brown (10YR 6/3) and few fine distinct light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm, brittle, and compact; common distinct clay films on faces of peds; few black concretions; slightly acid; gradual wavy boundary.

2Bt—46 to 62 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct pale brown (10YR 6/3) and light gray (10YR 7/2) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm; common distinct clay films on faces of peds; common black concretions and stains; about 1 percent angular chert fragments; very strongly acid.

The thickness of the solum ranges from 40 to 80 inches. The depth to bedrock is more than 80 inches. In unlimed areas reaction ranges from very strongly acid to slightly acid above and in the fragipan. It ranges from strongly acid to mildly alkaline below the fragipan. The content of rock fragments ranges from 0 to 10 percent in the 2Bt horizon and from 0 to 35 percent in the 2C horizon.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In some pedons it has few or common brownish mottles in the lower part. It is silt loam or silty clay loam.

Some pedons have a BA horizon. This horizon is 3 to 8 inches thick. It is silt loam or silty clay loam.

The Btx horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 4 to 8. It has few to many mottles in shades of brown or gray. In some pedons it has silt coatings on the prisms. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. It has few or common mottles in shades of brown or gray. It is silty clay loam, silty clay, or clay.

Some pedons have a 2C horizon. This horizon has colors and textures similar to those of the 2Bt horizon.

Nolichucky Series

The Nolichucky series consists of very deep, well drained, moderately permeable soils on ridgetops, high stream terraces, and the upper part of hillsides. Some areas are characterized by karst topography. These soils formed in old alluvium and the underlying

residuum derived mainly from limestone. Slopes range from 2 to 20 percent. The soils are fine-loamy, siliceous, mesic Typic Paleudults.

Nolichucky soils are associated on the landscape with Allegheny, Canmer, Caneyville, Fredonia, Nolin, and Riney soils. Allegheny and Riney soils have mixed mineralogy. Allegheny soils have a brown subsoil. Canmer soils are in a clayey family. Caneyville and Fredonia soils are moderately deep over bedrock. Nolin soils are on flood plains. They are in a fine-silty family.

Typical pedon of Nolichucky loam, 6 to 12 percent slopes, eroded; about 4.3 miles northeast of Munfordville, 1,500 feet east of Wintch Lane and 100 feet south of Kentucky Highway 2185, in a formerly cultivated field that has reverted to woodland; lat. 37 degrees 17 minutes 54 seconds and long. 85 degrees 49 minutes 07 seconds:

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; friable; few fine and coarse roots; neutral; abrupt smooth boundary.

AB—5 to 11 inches; yellowish brown (10YR 5/4) loam; weak medium granular structure; very friable; common fine roots; slightly acid; clear wavy boundary.

Bt1—11 to 15 inches; yellowish red (5YR 5/6) loam; weak medium subangular blocky structure; very firm; few fine and medium roots; few faint clay films on faces of peds; 10 percent angular chert fragments and quartz pebbles; very strongly acid; clear wavy boundary.

Bt2—15 to 24 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; very firm; few fine and medium roots; few faint clay films on faces of peds; about 10 percent angular chert fragments and quartz pebbles; very strongly acid; clear wavy boundary.

Bt3—24 to 31 inches; red (2.5YR 4/6) clay loam; common medium distinct yellowish red (5YR 4/6) and few fine prominent brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; few distinct clay films on faces of peds; about 5 percent angular chert fragments and quartz pebbles; very strongly acid; gradual smooth boundary.

Bt4—31 to 48 inches; dark red (2.5YR 3/6) clay loam; common fine distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; common prominent clay films on faces of peds; about 1 percent angular chert fragments and quartz pebbles; very strongly acid; clear smooth boundary.

2Bt5—48 to 65 inches; dark red (2.5YR 3/6) clay; strong medium subangular blocky structure; firm;

few medium and fine roots; common prominent clay films on faces of peds; about 1 percent angular chert fragments; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of rock fragments, mostly rounded quartz pebbles and angular chert, ranges from 5 to 15 percent throughout the profile. In unlimed areas reaction is very strongly acid or strongly acid throughout the profile.

The Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. The AB horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loam, clay loam, or sandy loam.

Some pedons have a BA horizon. This horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 6 to 8. It is mottled in shades of brown and red in the lower part. It is loam, sandy loam, sandy clay loam, or clay loam.

The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6 to 8. In some pedons it is mottled in shades of brown or red. It is clay loam or clay.

Nolin Series

The Nolin series consists of very deep, well drained, moderately permeable soils that formed in alluvium derived from limestone, sandstone, shale, and loess on uplands. These soils are on flood plains and in depressions in areas characterized by karst topography. Slopes range from 0 to 4 percent. The soils are fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts.

Nolin soils are associated on the landscape with Grigsby, Melvin, and Newark soils. Grigsby soils are in a coarse-loamy family. Melvin soils are poorly drained. Newark soils are somewhat poorly drained.

Typical pedon of Nolin silt loam, occasionally flooded; about 3.5 miles east of Linwood, 0.56 mile south of the intersection of Bennett Road and Kentucky Highway 566, about 0.28 mile south of Kentucky Highway 566, in a cultivated field; lat. 37 degrees 18 minutes 23 seconds and long. 85 degrees 42 minutes 44 seconds:

Ap—0 to 10 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; neutral; gradual wavy boundary.

BA—10 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

Bw1—14 to 30 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure;

friable; few fine roots; medium acid; gradual wavy boundary.

Bw2—30 to 42 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light yellowish brown and dark yellowish brown mottles; weak medium subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

Bw3—42 to 62 inches; yellowish brown (10YR 5/4) silt loam; common medium faint light yellowish brown (10YR 6/4) and few fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; medium acid.

The solum is 40 or more inches thick. Reaction ranges from medium acid to mildly alkaline throughout the profile.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The BA horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. In some pedons it is mottled in shades of brown below a depth of 24 inches and in shades of gray below a depth of 30 inches. It is silt loam or silty clay loam.

Otwell Series

The Otwell series consists of very deep, moderately well drained soils that have a fragipan. Permeability is moderate above the fragipan and very slow in the fragipan. These soils formed in mixed alluvium on old stream terraces. The terraces are generally above the flood plain but are subject to rare flooding. Slopes range from 0 to 2 percent. The soils are fine-silty, mixed, mesic Typic Fragiudalfs.

Otwell soils are associated on the landscape with Elk, Lawrence, and Nolin soils. Lawrence soils are poorly drained. Elk and Nolin soils are well drained. Nolin soils are on the adjacent flood plains.

Typical pedon of Otwell silt loam, 0 to 2 percent slopes, rarely flooded; about 3.2 miles east of the intersection of U.S. Highway 31E and Kentucky Highway 566 in Linwood, 75 feet southeast of Kentucky Highway 566, in a cultivated field; lat. 37 degrees 18 minutes 43 seconds and long. 85 degrees 42 minutes 37 seconds:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; few pebbles; slightly acid; abrupt smooth boundary.

Bt1—11 to 22 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6)

mottles; weak medium subangular blocky structure; friable; few fine faint clay films on faces of peds; common wormholes and wormcasts; few fine roots; few brown and black concretions; strongly acid; gradual wavy boundary.

Bt2—22 to 32 inches; light yellowish brown (10YR 6/4) silt loam; common fine faint yellowish brown (10YR 5/6) and common medium faint pale brown (10YR 6/3) and very pale brown (10YR 7/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; very strongly acid; abrupt wavy boundary.

Btx—32 to 70 inches; yellowish brown (10YR 5/8) silt loam; common medium prominent light gray (10YR 7/2) mottles; very coarse prismatic structure parting to moderate medium subangular blocky; very firm, brittle, and compact; very strongly acid; clear wavy boundary.

2C—70 to 75 inches; yellowish brown (10YR 5/8) gravelly silt loam; massive; firm; about 15 percent rounded pebbles and angular fragments; strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the upper part of the solum and from 0 to 15 percent below the fragipan. Reaction ranges from very strongly acid to neutral in the Ap horizon and is strongly acid or very strongly acid in the Bt and Btx horizons. It ranges from strongly acid to moderately alkaline in the 2C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam or silty clay loam.

The Btx horizon has hue of 10YR, 2.5Y, or 7.5YR, value of 4 to 7, and chroma of 2 to 8. It is silt loam, loam, silty clay loam, or clay loam.

The 2C horizon has colors similar to those of the Btx horizon. In some pedons it is stratified. The texture of the fine-earth fraction is silt loam, silty clay loam, sandy loam, sandy clay loam, or clay loam with thin layers of silty clay and fine sand. The content of rock fragments ranges from 0 to 15 percent.

Riney Series

The Riney series consists of deep and very deep, well drained, moderately rapidly permeable soils. These soils formed in material weathered from unconsolidated or weakly consolidated sandstone and shale that in places has slumped into sinkholes. They are on narrow ridgetops and hillsides and on karst landscapes. Slopes

range from 2 to 30 percent. The soils are fine-loamy, siliceous, mesic Typic Hapludults.

Riney soils are associated on the landscape with Caneyville, Canmer, Gatton, Jefferson, Lily, Sonora, and Vertrees soils. Caneyville and Vertrees soils are in a fine textured family. Canmer soils are in a clayey family. Lily soils are moderately deep over sandstone bedrock. Sonora soils have mixed mineralogy. Gatton soils have a fragipan. They are moderately well drained. Jefferson soils have a brown Bt horizon. They formed in colluvium.

Typical pedon of Riney loam, karst, 12 to 20 percent slopes, eroded; about 12.0 miles northeast of Munfordville, 0.5 mile west of Aetna Furnace, 800 feet north of Kentucky Highway 936, in an uncultivated field; lat. 37 degrees 22 minutes 45 seconds and long. 85 degrees 43 minutes 17 seconds:

Ap—0 to 4 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; many fine and medium roots; about 10 percent quartzite pebbles; very strongly acid; abrupt smooth boundary.

BE—4 to 10 inches; light yellowish brown (10YR 6/4) loam; weak medium subangular blocky structure parting to moderate medium and weak fine granular; friable; common fine and few coarse roots; few distinct clay films on faces of peds; about 10 percent quartzite pebbles; very strongly acid; clear smooth boundary.

Bt1—10 to 28 inches; red (2.5YR 4/6) clay loam; weak medium angular and subangular blocky structure; friable; few fine and medium roots; common distinct clay films on faces of peds; about 5 percent quartzite pebbles ½ inch to 2 inches in diameter; very strongly acid; gradual smooth boundary.

Bt2—28 to 43 inches; red (2.5YR 4/6) sandy clay loam that has streaks of strong brown (7.5YR 5/6); weak medium subangular blocky structure; friable; few fine and coarse roots; few distinct clay films on faces of peds; about 8 percent quartzite pebbles; very strongly acid; clear smooth boundary.

CB—43 to 75 inches; red (2.5YR 5/8) very gravelly sandy loam; few fine distinct yellowish red (5YR 5/8) and common fine faint brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; about 40 percent quartzite pebbles; very strongly acid.

The thickness of the solum ranges from 40 to 80 inches. The depth to soft sandstone bedrock ranges from 48 to more than 120 inches. In unlimed areas reaction is strongly acid or very strongly acid throughout the profile. The content of quartzite pebbles and

ironstone fragments ¼ inch to 1 inch in diameter ranges from 0 to 10 percent in the Ap horizon and from 0 to 20 percent in the upper part of the Bt horizon. In the lower part of the Bt horizon, the content of quartzite pebbles and soft sandstone fragments ranges from 0 to 20 percent. The content of quartzite pebbles and soft sandstone fragments ranges from 0 to 40 percent in the BC horizon and in the C horizon, if it occurs.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The BE horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam, fine sandy loam, clay loam, or sandy clay loam.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons it has hue of 10YR or 7.5YR in the upper part. It is mottled in shades of red or brown in the lower part. It is loam, clay loam, sandy loam, or sandy clay loam.

The CB horizon has colors similar to those of the Bt horizon. It is sandy clay loam, fine sandy loam, sandy loam, loamy sand, or the gravelly or very gravelly analogs of those textures.

Some pedons have a C horizon. This horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is sandy clay loam, sandy loam, fine sandy loam, loamy sand, or the gravelly or very gravelly analogs of those textures.

Sonora Series

The Sonora series consists of very deep, well drained, moderately permeable soils that formed in a mantle of silt over unconsolidated sandstone and shale. The underlying material has slumped into sinkholes during an earlier weathering and erosion cycle. These soils are on ridgetops characterized by karst topography. Slopes range from 2 to 12 percent. The soils are fine-loamy, mixed, mesic Typic Paleudalfs.

The Sonora soils in this survey area are taxadjuncts to the series because they have siliceous mineralogy.

Sonora soils are associated on the landscape with Caneyville, Canmer, Gatton, Riney, and Vertrees soils. Caneyville soils are in a fine textured family and are less than 40 inches deep over bedrock. Gatton soils are moderately well drained and have a fragipan. Riney soils have more sand and less silt in the upper part of the B horizon than the Sonora soils. Canmer and Vertrees soils have a red subsoil. Canmer soils are in a clayey family, and Vertrees soils are in a fine textured family.

Typical pedon of Sonora silt loam, 2 to 6 percent slopes; about 11.0 miles northeast of Munfordville, 0.3 mile south of Tampa Branch Road, 250 feet west of U.S. Highway 31E, in an orchard; lat. 37 degrees 23

minutes 58 seconds and long. 85 degrees 45 minutes 45 seconds:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak coarse subangular blocky structure parting to moderate medium granular; friable; many fine roots; slightly acid; abrupt wavy boundary.

BA—7 to 11 inches; strong brown (7.5YR 4/6) silt loam; dark yellowish brown (10YR 4/4) tongues; moderate medium and coarse subangular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

Bt1—11 to 25 inches; strong brown (7.5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common faint clay films on faces of peds; about 1 percent quartzite pebbles; slightly acid; abrupt smooth boundary.

2Bt2—25 to 34 inches; strong brown (7.5YR 5/6) clay loam; moderate medium and coarse subangular blocky structure parting to moderate fine angular blocky; firm; few fine roots; common prominent clay films on faces of peds; about 1 percent quartzite pebbles less than 1 inch in diameter; medium acid; clear smooth boundary.

2Bt3—34 to 51 inches; yellowish red (5YR 4/6) clay loam; many medium distinct red (2.5YR 4/6) and many medium prominent strong brown (7.5YR 5/8) mottles; strong coarse angular and subangular blocky structure; firm; common faint clay films on faces of peds; about 1 percent quartzite pebbles; very strongly acid; gradual wavy boundary.

2BC—51 to 62 inches; mottled very pale brown (10YR 7/3), red (2.5YR 4/6), and strong brown (7.5YR 5/6) clay loam; weak coarse angular blocky structure; firm; common prominent clay films on faces of peds; about 1 percent quartzite pebbles; very strongly acid; gradual irregular boundary.

2C—62 to 72 inches; very pale brown (10YR 7/3) loam; common medium prominent yellowish red (5YR 4/6) and red (2.5YR 4/6) mottles; massive; firm; about 2 percent quartzite pebbles; very strongly acid.

The thickness of the solum and the depth to bedrock are more than 60 inches. In unlimed areas reaction ranges from slightly acid to very strongly acid in the Ap horizon and the upper part of the B horizon. It is strongly acid or very strongly acid below these horizons. The content of chert, quartzite, or sandstone rock fragments ranges from 0 to 5 percent throughout the profile.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The BA horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4

to 6. It is silt loam or silty clay loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is mottled in shades of red, brown, or gray. It is loam, sandy clay loam, or clay loam.

The 2BC horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is mottled in shades of red, brown, and gray. It is loam, sandy clay loam, or clay loam.

The 2C horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR, value of 4 to 7, and chroma of 3 to 8. It is mottled in shades of red, brown, and gray. It is clay loam, sandy clay loam, or loam.

Some pedons have a 3Bt horizon. This horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is mottled in shades of brown and gray or is evenly mottled in shades of red, brown, and gray. It is sandy clay loam, sandy clay, clay loam, or clay. Some pedons have a 3BC horizon, which has colors and textures similar to those of the 3Bt horizon.

Tilsit Series

The Tilsit series consists of deep and very deep, moderately well drained soils that have a fragipan. Permeability is moderate above the fragipan and slow or very slow in the fragipan. These soils formed in silty material weathered from acid sandstone and shale. They are on ridgetops in the northern, central, and western parts of the county. Slopes range from 2 to 12 percent. The soils are fine-silty, mixed, mesic Typic Fragiudults.

Tilsit soils are associated on the landscape with Wellston, Lily, and Riney soils. The associated soils do not have a fragipan. They are well drained. Lily soils are moderately deep. Riney soils are in a fine-loamy family.

Typical pedon of Tilsit silt loam, 2 to 6 percent slopes; about 3.3 miles south of Cub Run, 0.8 mile west of the intersection of Kentucky Highway 1827 and Dennison Ferry Road, 0.1 mile west of Cherry Springs Church, 0.6 mile east of the Edmonson County line, 25 feet north of Kentucky Highway 1827, in a cultivated field; lat. 37 degrees 16 minutes 05 seconds and long. 86 degrees 05 minutes 00 seconds:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; many fine and few medium roots; very strongly acid; abrupt smooth boundary.

BA—6 to 9 inches; yellowish brown (10YR 5/6) silt

loam; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; very strongly acid; abrupt wavy boundary.

Bt2—14 to 19 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; very strongly acid; abrupt wavy boundary.

Bt3—19 to 23 inches; yellowish brown (10YR 5/4) loam; few fine faint pale brown mottles; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btx1—23 to 36 inches; light olive brown (2.5Y 5/4) loam; common medium distinct light gray (2.5Y 7/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, brittle, and compact; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btx2—36 to 43 inches; mottled light olive brown (2.5Y 5/4) and olive brown (2.5Y 4/4) loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, brittle, and compact; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—43 to 57 inches; mottled olive yellow (2.5Y 6/6), light olive brown (2.5Y 5/6), and dark grayish brown (2.5Y 4/2) loam; moderate medium subangular blocky structure; firm; very strongly acid; gradual wavy boundary.

C—57 to 60 inches; mottled yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) sandy loam; massive; firm; about 10 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock ranges from 40 to 120 inches. In unlimed areas reaction ranges from strongly acid to extremely acid throughout the profile. The content of rock fragments ranges from 0 to 10 percent in the upper part of the solum, from 0 to 40 percent in the lower part, and from 10 to 50 percent in the substratum.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The BA horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6.

The Bt horizon has hue of 2.5Y or 10YR, value of 4

to 6, and chroma of 4 to 8. It is mottled in shades of brown. It is loam, silt loam, or silty clay loam.

The Btx and BC horizons have hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 to 8. They are mottled in shades of gray, brown, or olive. They are loam, silt loam, or silty clay loam.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 2 to 8. It is sandy loam, silty clay loam, sandy clay loam, clay loam, or silty clay.

Vertrees Series

The Vertrees series consists of very deep, well drained, moderately slowly permeable soils that formed in material weathered from limestone and interbedded shale. These soils are in karst limestone valleys. Slopes range from 2 to 30 percent. The soils are fine, mixed, mesic Typic Paleudalfs.

Vertrees soils are associated on the landscape with Hagerstown, Fredonia, and Caneyville soils. Hagerstown soils have bedrock at a depth of 40 to 60 inches. Fredonia and Caneyville soils are moderately deep over bedrock.

Typical pedon of Vertrees silt loam, in an area of Hagerstown-Fredonia-Vertrees silt loams, rocky, 2 to 6 percent slopes; about 2.6 miles northwest of the intersection of Kentucky Highway 218 and U.S. Highway 31W, in Horse Cave, 0.7 mile north of the intersection of Kentucky Highway 218 and Fisher Ridge Road, 0.2 mile west on a gravel lane, 100 feet west of the lane, in a cultivated field; lat. 37 degrees 12 minutes 45 seconds and long. 85 degrees 56 minutes 21 seconds:

Ap—0 to 6 inches; brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; friable; many very fine roots; neutral; clear smooth boundary.

BA—6 to 12 inches; brown (7.5YR 4/4) silty clay loam; weak fine subangular blocky structure; friable; common very fine roots; neutral; clear smooth boundary.

Bt1—12 to 20 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark reddish brown (5YR 3/4) clay films on faces of peds; few black stains on faces of peds; medium acid; gradual smooth boundary.

Bt2—20 to 38 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common distinct red (2.5YR 4/6) clay films on faces of peds; medium acid; gradual smooth boundary.

Bt3—38 to 54 inches; dark red (2.5YR 3/6) clay; moderate medium angular blocky structure; firm; many distinct clay films on faces of peds; medium

acid; gradual smooth boundary.

Bt4—54 to 73 inches; dark red (2.5YR 3/6) clay; common fine distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky and moderate fine angular blocky structure; firm; many distinct clay films and few black stains on faces of peds; slightly acid; clear smooth boundary.

Bt5—73 to 79 inches; red (2.5YR 4/6) clay; few fine distinct yellowish red (5YR 5/8) mottles; moderate medium angular blocky structure; very firm; common distinct clay films on faces of peds; few black stains on faces of peds; neutral.

The thickness of the solum and the depth to bedrock are more than 60 inches. In unlimed areas reaction ranges from very strongly acid to medium acid in the upper part of the solum. It ranges from very strongly acid to neutral in the lower part of the solum. The content of rock fragments is commonly less than 15 percent, but most horizons do not contain coarse fragments.

The Ap horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam.

The BA horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The upper part of the Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is silty clay loam, silty clay, or clay. The lower part has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 6 to 8. In most pedons it is mottled in shades of red or yellow. It is silty clay or clay.

In some pedons a BC horizon is below a depth of about 50 inches. This horizon has platy or relict shale structure in some parts. It has colors and textures similar to those of the Bt horizon.

Wallen Series

The Wallen series consists of moderately deep, somewhat excessively drained, moderately rapidly permeable soils that formed in material weathered from acid sandstone. These soils are on steep hillsides. Slopes range from 20 to 30 percent. The soils are loamy-skeletal, siliceous, mesic Typic Dystrochrepts.

Wallen soils are associated on the landscape with Bledsoe, Caneyville, Lily, Tilsit, and Wellston soils. Bledsoe and Caneyville soils are in a fine textured family. Bledsoe soils are deep over bedrock. Lily soils have an argillic horizon. They are in a fine-loamy family. Tilsit and Wellston soils are in a fine-silty family. Tilsit soils have a fragipan.

Typical pedon of Wallen gravelly loam, in an area of

Bledsoe-Wallen-Rock outcrop complex, 20 to 30 percent slopes; about 1.1 miles east of Horse Cave, 0.5 mile north of the intersection of Kentucky Highway 218 and Wooten's Knob Road, in a roadcut on the east side of Wooten's Knob Road, in a wooded area; lat. 37 degrees 11 minutes 03 seconds and long. 85 degrees 52 minutes 27 seconds:

- Oi—2 inches to 0; loose, partially decomposed hardwood leaf litter.
- A—0 to 2 inches; very dark gray (10YR 3/1) gravelly loam; weak fine granular structure; very friable; many very fine and fine roots; about 15 percent sandstone fragments less than 3 inches in diameter; neutral; clear smooth boundary.
- E—2 to 6 inches; brown (10YR 4/3) gravelly sandy loam; few fine distinct very dark gray (10YR 3/1) organic stains; weak fine granular structure; very friable; many fine and few coarse roots; about 15 percent sandstone fragments less than 3 inches in diameter; medium acid; clear smooth boundary.
- Bw1—6 to 14 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak fine granular and weak medium subangular blocky structure; friable; many fine and few coarse roots; about 20 percent sandstone fragments, dominantly 1 to 5 inches in diameter; medium acid; gradual wavy boundary.
- Bw2—14 to 20 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine to coarse roots; about 35 percent sandstone fragments, dominantly 1 to 6 inches in diameter; very strongly acid; clear smooth boundary.
- Bw3—20 to 30 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; moderate medium subangular blocky structure; friable; common medium and fine roots; about 45 percent sandstone fragments, dominantly 1 to 10 inches in diameter; very strongly acid; abrupt smooth boundary.
- R—30 inches; hard sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of sandstone fragments or quartzite pebbles ranges from 0 to 35 percent, by volume, in the surface and subsurface layers. The content of rock fragments ranges from 20 to 50 percent in the Bw horizon. In unlimed areas reaction ranges from medium acid to very strongly acid throughout the profile.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 4. Some pedons have an AB horizon, which has colors and textures similar to those of the A horizon.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam, silt loam, fine sandy loam, or sandy loam.

The Bw horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6. It is sandy loam, loam, or fine sandy loam in the fine-earth fraction. Some pedons have a BC horizon, which has colors and textures similar to those of the Bw horizon.

Some pedons have a Cr horizon of weathered, broken, and fractured sandstone. This horizon is directly above the hard sandstone bedrock.

Wellston Series

The Wellston series consists of deep and very deep, well drained, moderately permeable soils that formed in a cap of loess or silt over residuum or colluvium derived from siltstone, shale, and sandstone. These soils are on ridgetops, the upper part of hillsides, and foot slopes. Slopes range from 2 to 20 percent. The soils are fine-silty, mixed, mesic Ultic Hapludalfs.

Wellston soils are associated on the landscape with Jefferson, Lily, Riney, and Tilsit soils. Lily, Jefferson, and Riney soils are in a fine-loamy family. Lily soils are moderately deep. Tilsit soils have a fragipan and are moderately well drained.

Typical pedon of Wellston silt loam, 2 to 6 percent slopes; about 10 miles northwest of Munfordville, about 2 miles south of the intersection of Pleasant Hill Church Road and Bonnieville-Lone Star Road, 100 feet east of the road, in an alfalfa field; lat. 37 degrees 24 minutes 19 seconds and long. 85 degrees 56 minutes 54 seconds:

- Ap—0 to 10 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; gradual wavy boundary.
- BE—10 to 13 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; friable; few fine roots; slightly acid; gradual wavy boundary.
- Bt1—13 to 18 inches; yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; medium acid; gradual wavy boundary.
- Bt2—18 to 26 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.
- 2Bt3—26 to 33 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few sandstone fragments; few

faint clay films on faces of peds; strongly acid; abrupt wavy boundary.

2BC—33 to 45 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; few fine roots; very strongly acid; gradual wavy boundary.

2C—45 to 62 inches; mottled yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and red (2.5YR 4/6) sandy clay loam; massive; firm; very strongly acid.

The thickness of the solum ranges from 36 to 50 inches. The depth to sandstone bedrock or to gray, soft, acid shale bedrock ranges from 40 to 72 inches. In unlimed areas reaction ranges from medium acid to very strongly acid throughout the profile. The content of rock fragments ranges from 0 to 15 percent in the Ap

and Bt horizons and from 0 to 35 percent in the 2Bt, 2BC, and 2C horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. The BE horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam or silt loam. The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam, loam, or silt loam.

The 2BC horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is mottled in shades of brown. It is loam, clay loam, silty clay loam, or silt loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is mottled in shades of red and brown. It is silt loam, clay loam, sandy clay loam, or sandy loam.

Formation of the Soils

This section provides information concerning formation of the soils in Hart County. It describes the five factors of soil formation and explains their effects on the soils in the county.

The discipline of soil science began in the late 19th century, when the concept of soils as an organized natural body was initially developed. According to this concept, a soil is a unique individual whose properties are not the result of any single factor, such as geology, but rather the result of the interaction of several factors working together (13).

Five recognized factors are involved in soil formation. These are parent material, relief, climate, plant and animal life, and time. Each factor is capable of working independently to influence the properties of a soil (10). In many instances, however, these factors are dependent upon each other. For example, organisms in a soil are influenced by the climate and relief of the area. It is of interest in soil science to separate the influences each of the factors has on a particular group of soils in order to understand the relationships between soils and how their characteristics vary because of these factors. The following discussion examines the soils of Hart County and how they were influenced by the factors of soil formation.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It is variable, especially in terms of degree of consolidation, texture, and mineralogy. Parent material exerts the greatest influence on soil characteristics in young soils. As soils mature, pedogenic processes controlled by climate, relief, and plant and animal life modify the features that were inherited from the parent material.

Most of the soils in Hart County formed in residuum derived from a variety of consolidated sedimentary rocks. Other kinds of parent material in the county include loess, alluvium, and colluvium.

The geologic formations that are exposed in Hart County are a mixture of limestone, sandstone, siltstone, and shale that vary in geologic age from Lower Mississippian to Lower Pennsylvanian. A large area in

the southern part of the county is composed of soils that formed in rock of dominantly limestone composition. The highly calcitic nature of this rock has led to the formation of karst landscapes. Baxter and Frederick soils are examples of soils that formed in this area. These soils are deeply weathered and have a clayey texture as a result of the influence of the parent material. Chert, which is a residual weathering product of limestone, is in both soils. The moderately deep Fredonia and Caneyville soils also formed in limestone. They have a clayey subsoil.

Wallen and Lily soils formed in sandstone residuum and thus exhibit properties such as sandy textures, acidic reaction, and low base saturation. Lenberg soils have a subsoil of silty clay loam and silty clay and an acidic pH level as a result of their formation in acidic, clayey shale. Riney and Sonora soils formed in weakly consolidated sandstone and shale that in certain areas of the county have slumped into sinkholes during an early cycle of karst erosion of the underlying limestone.

Soils on many of the stable ridgetops throughout the county formed in a thin to moderately thick layer of wind-transported, dominantly silt-sized material called loess. Loess is presumed to have been deposited in post-glacial periods of the Pleistocene. It once covered entire landscapes in this region but has subsequently been eroded from all positions except the more stable uplands and side slopes, where it ranges from several inches to as much as 30 inches in thickness. Soils on these ridgetops formed in both loess and residuum. Some soils, such as Crider, Nicholson, and Wellston soils, are silty in the upper part of the profile, but the lower part is characteristic of the residuum on which the loess was deposited.

Soils on flood plains and stream terraces formed in alluvium washed from higher landscapes. These soils are composed of materials from loess and residual geologic formations. These materials were sorted to some extent during deposition. Newark, Nolin, Lindsie, and Melvin soils formed in recent alluvium that is silty in texture. Grigsby soils are derived from sandier textured materials and are loamy.

Stream terraces are old alluvial plains that no longer

receive deposition. Elk and Otwell soils are examples of soils that formed on terraces. They have a greater degree of profile development than soils that formed in recent alluvium.

Colluvium is material removed from soils on the side slopes of steep hills and deposited on foot slopes by gravity. Bledsoe and Jefferson soils are examples of soils that formed in colluvium from a variety of residual sedimentary rocks. They are loamy and have some sandstone or limestone fragments distributed throughout the profile.

Relief

Relief has a dramatic effect on the properties of soils as they develop on a particular landscape. Many of the properties of a soil in a specific geographic area are related to the soil's position on the landscape. The distribution of soils on the landscape, moisture conditions, soil temperature, and patterns of erosion and deposition are all related to the relief of an area.

Hillslope models divide landscapes into positions based on topography. The summit is generally regarded as the most stable, and the most well developed soils are on summits of hills. Baxter, Crider, Canmer, and Frederick soils are examples. The deeply weathered profiles and well developed argillic horizons in these soils are indicative of a lesser degree of erosion, a higher rate of water infiltration, and a greater degree of illuviation of clay than are characteristic of soils in lower positions on the landscape.

Soils on side slopes are generally less well developed and shallower than the soils on ridgetops and thus have a lower rate of water infiltration, a higher runoff rate, and a higher degree of erosion. The shallower depth of these soils indicates that geologic erosion is proceeding at a rate nearly as rapid as that of soil development. Soils on side slopes, such as Caneyville, Wallen, and Fredonia soils, are frequently mapped in complexes with rock outcrop, which appears at the surface because of shallow development or excessive erosion.

Toe slopes are depositional sites that receive soil material from alluvial deposition. Soils on toe slopes, such as Nolin, Grigsby, Melvin, and Newark soils, are deep and have weakly developed profiles because of frequent deposition of sediments. These soils remain morphologically young because of these depositions.

Relief also plays a large role in moisture relations, or wetness of the profile. The term catena has been used to describe a group of geographically associated soils that vary in natural drainage because of differences in relief. Natural drainage refers to the frequency and duration of saturation of a soil profile during the time of

soil formation. Generally, soils in the higher landscape positions tend to have better drainage than soils on bottom land. Well drained soils, such as Baxter, Jefferson, Lily, and Elk soils, tend to have yellowish, brownish, or reddish colors and no low-chroma, or gray, mottles in the upper part of the profile. Soils that are more poorly drained show an increase in gray colors. The alluvial Nolin, Lindside, Newark, and Melvin soils represent a drainage sequence ranging from well drained to poorly drained.

Many soils on ridgetops and in gently sloping landscape positions are less well drained because they have a fragipan. A fragipan is a dense, brittle subsoil layer that appears cemented and that can restrict drainage. Many soils in Hart County, such as Gatton, Lawrence, Nicholson, Otwell, and Tilsit soils, have a fragipan. These soils may have a seasonal high water table because water is perched above the fragipan during the wetter seasons.

Climate

Climate influences the rate and degree of weathering and soil formation. Temperature and precipitation are most important and are used in soil classification because of their impact on plant growth. Temperature influences the kinds and amounts of living organisms and the rate of chemical weathering, mineral breakdown, and transformation. As precipitation increases, the leaching of soluble salts and exchangeable bases also increases, leading to lower base saturation and more acidic soils. During the leaching process, the original geologic material is altered and soil horizons are formed. Calcareous limestone, for example, is high in carbonates and clay minerals. Because of weathering, however, the soils that formed in this parent material have acid reaction, a loamy surface texture, and a clayey subsoil.

Because of variations in relief and aspect on the landscape, the overall influence of these climatic factors on soil formation is modified within relatively small areas. This variable climatic effect on a small area is called microclimate. The amount of moisture that actually percolates through the soil is governed by the amount of runoff and the rate of evapotranspiration from the surface. Slope, aspect, and vegetation modify the overall effects of temperature and precipitation on the soil.

The climate of Hart County is humid and temperate. Summers are warm, winters are cool, and precipitation is distributed throughout the year. The parent material in stable landscape positions has undergone sufficient weathering to create mature, well developed soils. Tilsit, Wellston, and Crider soils are examples. Among these

soils on ridgetops, the amount of exchangeable bases in the profile varies, resulting in differences in soil classification. These differences are often the result of the initial amount of bases in the parent material rather than of the influence of climate on the degree of weathering. Soils in the steeper landscape positions, such as Caneyville and Jefferson soils, tend to be well developed but are generally not as deeply weathered as the soils on ridgetops because of a higher runoff rate and a higher degree of erosion.

Plant and Animal Life

Plants and animals in and on the soil are active forces in the process of soil formation in Hart County. The organisms vary from microscopic bacteria and fungi to the trees and grasses that cover the land surface. Many forms of animal life are in the soil, including earthworms, grubs, moles, and mice. These organisms influence the addition and decomposition of organic matter, nitrogen content, nutrient cycling, mineral weathering, and mixing of soil materials.

The kinds and amounts of organisms in a soil are influenced by the climate or microclimate in an area. The population of plants and animals may vary depending on the moisture conditions or the temperature of a soil.

In Hart County, the native vegetative community was mostly oak-hickory forest. Most of the soils formed under this forest type. The content of organic matter is lower and the degree of illuviation is greater in these soils than in soils that formed under prairie grass vegetation. Although parts of Hart County may have been covered by prairie vegetation in the past, the influence of this type of vegetation on soil formation has been diminished over time, especially as human activities resulted in changes in land use.

In nearly all areas of the county, human activities have altered the natural process of soil formation

through urban and industrial development and farming practices. The types of vegetation found on the land surface have changed, soils have been disturbed, and the hazard of erosion has increased.

Time

Time is the number of years that geologic parent material has remained in place undergoing soil-forming processes. Generally, the longer the processes have continued, the older the soil and the more well developed the soil profile. Soil development is measured by the depth of weathering, the formation of distinct soil horizons, and a higher content of clay in the subsoil than in the surface layer. The rate of soil development varies according to the type of parent material, the climate, and the stability of the landscape.

The soils in Hart County range in age from young to old. The youngest soils, Melvin, Newark, and Nolin, are in alluvial landscape positions. They have profiles with indistinct soil horizons and show little other evidence of soil development. Soils that formed on stream terraces, such as Elk and Otwell soils, are older and have developed the profile characteristics common to mature soils.

Frederick, Canmer, Vertrees, Hagerstown, Nolichucky, Baxter, and Crider soils represent the oldest, most mature soils in the county. These soils formed in stable landscape positions in a variety of residual or old alluvial parent materials. They are all deeply weathered, show distinct horizonation, and have well developed argillic subsoil horizons.

Soils can be further categorized based on nutrient content (base saturation) of the subsoil. Soils with lower base saturation, such as Nolichucky and Canmer soils, may be more highly weathered and older than soils with higher base saturation, such as Baxter and Crider soils. However, differences in base saturation may also reflect differences in fertility of the original parent material.

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Glossary

AC soil. A soil having only an A and a C horizon.

Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Aspect. The direction that a slope faces.

Cool aspect.—Slopes of more than 15 percent facing an azimuth of 315 to 135 degrees.

Warm aspect.—Slopes of more than 15 percent facing an azimuth of 135 degrees.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low.....	less than 2.4
Low.....	2.4 to 3.2
Moderate.....	3.2 to 5.2
High.....	more than 5.2

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K),

expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen

hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate

pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil

readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers

to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as

protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled

by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones (in tables). Rock fragments that are 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no

natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma.

For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Organic matter. Plant and animal residue in the soil in various stages of decomposition. Adjectives used in this survey to describe content of organic matter are:

Low	less than 2 percent
Moderate	2 to 4 percent
High	more than 4 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil, adversely affecting the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil

that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. Terms used in this survey to describe the range of slopes are as follows:

Nearly level.....	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping.....	6 to 12 percent
Moderately steep	12 to 20 percent
Steep.....	20 to 30 percent
Very steep	30 to 80 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E,

and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be

further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION
(Recorded in the period 1951-81 at Hodgenville, Kentucky)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
° F	° F	° F	° F	° F	Units	In	In	In		In	
January-----	41.9	22.5	32.2	70	-9	33	4.04	1.48	6.17	7	5.7
February-----	47.0	24.5	35.8	74	-5	23	3.51	1.42	5.26	7	4.4
March-----	59.7	35.4	47.6	83	9	117	4.82	2.64	6.74	10	2.6
April-----	71.0	44.9	58.0	86	27	248	5.38	2.70	7.71	8	.0
May-----	76.9	52.2	64.6	90	31	453	4.29	2.49	5.88	8	.0
June-----	84.6	61.0	72.8	93	44	684	4.59	3.04	6.00	7	.0
July-----	87.7	64.7	76.2	97	51	812	5.07	2.76	7.10	7	.0
August-----	86.5	63.5	75.0	96	49	775	4.44	2.12	6.43	6	.0
September---	81.4	57.4	69.4	94	39	582	4.22	1.76	6.30	6	.0
October-----	70.3	45.0	57.7	87	24	261	3.28	1.91	4.49	6	.0
November-----	57.4	36.5	47.0	79	14	55	4.40	1.99	6.46	7	1.6
December-----	48.0	28.8	38.4	68	5	8	4.57	2.34	6.51	7	.9
Yearly:											
Average---	67.7	44.7	56.2	---	---	---	---	---	---	---	---
Extreme---	---	---	---	98	-9	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,051	52.61	43.85	60.48	86	15.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL
(Recorded in the period 1951-81 at Hodgenville, Kentucky)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 6	Apr. 12	May 6
2 years in 10 later than--	Apr. 2	Apr. 8	Apr. 30
5 years in 10 later than--	Mar. 25	Apr. 1	Apr. 19
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 26	Oct. 6	Sept. 29
2 years in 10 earlier than--	Oct. 31	Oct. 13	Oct. 5
5 years in 10 earlier than--	Nov. 11	Oct. 26	Oct. 15

TABLE 3.--GROWING SEASON
(Recorded in the period 1951-81 at Hodgenville,
Kentucky)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	210	186	157
8 years in 10	217	194	164
5 years in 10	231	208	179
2 years in 10	246	224	195
1 year in 10	257	235	207

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AlA	Allegheny loam, 0 to 2 percent slopes, rarely flooded-----	205	0.1
AlB	Allegheny loam, 2 to 6 percent slopes, rarely flooded-----	1,174	0.4
AlC	Allegheny loam, 6 to 12 percent slopes, rarely flooded-----	1,125	0.4
BaB	Baxter gravelly silt loam, 2 to 6 percent slopes-----	5,441	2.0
BaC2	Baxter gravelly silt loam, 6 to 12 percent slopes, eroded-----	15,385	5.8
BaD2	Baxter gravelly silt loam, 12 to 20 percent slopes, eroded-----	10,481	3.9
BaE	Baxter gravelly silt loam, 20 to 30 percent slopes-----	1,001	0.4
BmE	Bledsoe-Wallen-Rock outcrop complex, 20 to 30 percent slopes-----	17,550	6.6
CaD	Caneyville silt loam, very rocky, 6 to 20 percent slopes-----	19,051	7.1
CaE	Caneyville silt loam, very rocky, 20 to 30 percent slopes-----	10,249	3.8
CeD3	Caneyville silty clay loam, very rocky, 6 to 20 percent slopes, severely eroded----	1,725	0.6
CnB	Canmer silt loam, 2 to 6 percent slopes-----	218	0.1
CnC2	Canmer silt loam, 6 to 12 percent slopes, eroded-----	2,784	1.0
CnD2	Canmer silt loam, 12 to 20 percent slopes, eroded-----	4,989	1.9
CnE	Canmer silt loam, 20 to 30 percent slopes-----	1,040	0.4
CoD3	Canmer clay loam, 12 to 20 percent slopes, severely eroded-----	219	0.1
CrB2	Crider silt loam, 2 to 6 percent slopes, eroded-----	7,845	2.9
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded-----	4,923	1.8
ElB	Elk silt loam, 2 to 6 percent slopes, rarely flooded-----	623	0.2
FaB2	Frederick silt loam, 2 to 6 percent slopes, eroded-----	1,490	0.6
FaC2	Frederick silt loam, 6 to 12 percent slopes, eroded-----	7,927	3.0
FaD2	Frederick silt loam, 12 to 20 percent slopes, eroded-----	8,080	3.0
FaE	Frederick silt loam, 20 to 30 percent slopes-----	832	0.3
FcC3	Frederick silty clay loam, 6 to 12 percent slopes, severely eroded-----	976	0.4
FcD3	Frederick silty clay loam, 12 to 20 percent slopes, severely eroded-----	874	0.3
FdC	Fredonia-Hagerstown-Vertrees silt loams, rocky, 6 to 20 percent slopes-----	12,346	4.6
FdC3	Fredonia-Hagerstown-Vertrees complex, rocky, 6 to 20 percent slopes, severely eroded-----	709	0.3
GaB	Gatton silt loam, 2 to 6 percent slopes-----	778	0.3
Gr	Grigsby fine sandy loam, occasionally flooded-----	2,665	1.0
HdB	Hagerstown-Fredonia-Vertrees silt loams, rocky, 2 to 6 percent slopes-----	2,549	1.0
JfD	Jefferson-Lily-Rock outcrop complex, 12 to 20 percent slopes-----	3,313	1.2
JfE	Jefferson-Lily-Rock outcrop complex, 20 to 30 percent slopes-----	20,571	7.7
La	Lawrence silt loam, occasionally flooded-----	277	0.1
LdC	Lenberg silt loam, 6 to 12 percent slopes-----	166	0.1
LdD	Lenberg silt loam, 12 to 20 percent slopes-----	543	0.2
LdE	Lenberg silt loam, 20 to 30 percent slopes-----	321	0.1
LlB	Lily loam, 2 to 6 percent slopes-----	406	0.2
LlC	Lily loam, 6 to 12 percent slopes-----	6,169	2.3
LlD	Lily loam, 12 to 20 percent slopes-----	4,134	1.5
Ln	Lindside silt loam, occasionally flooded-----	776	0.3
Me	Melvin silt loam, ponded-----	756	0.3
Nb	Newark silt loam, occasionally flooded-----	1,762	0.7
NcB	Nicholson silt loam, 2 to 6 percent slopes-----	556	0.2
NhB2	Nolichucky loam, 2 to 6 percent slopes, eroded-----	379	0.1
NhC2	Nolichucky loam, 6 to 12 percent slopes, eroded-----	2,061	0.8
NhD2	Nolichucky loam, 12 to 20 percent slopes, eroded-----	2,184	0.8
No	Nolin silt loam, occasionally flooded-----	3,487	1.3
Np	Nolin silt loam, depressional, frequently flooded-----	1,710	0.6
OtA	Otwell silt loam, 0 to 2 percent slopes, rarely flooded-----	796	0.3
Pt	Pits, quarries-----	123	0.1
RnB	Riney loam, karst, 2 to 6 percent slopes-----	531	0.2
RnC2	Riney loam, karst, 6 to 12 percent slopes, eroded-----	5,691	2.1
RnD2	Riney loam, karst, 12 to 20 percent slopes, eroded-----	7,198	2.7
RnE	Riney loam, karst, 20 to 30 percent slopes-----	3,325	1.2
RrC2	Riney loam, ridge, 6 to 12 percent slopes, eroded-----	4,445	1.7
RrD2	Riney loam, ridge, 12 to 20 percent slopes, eroded-----	6,731	2.5
RxE	Rock outcrop-Caneyville complex, 12 to 30 percent slopes-----	8,728	3.3
SnB	Sonora silt loam, 2 to 6 percent slopes-----	2,189	0.8
SnC	Sonora silt loam, 6 to 12 percent slopes-----	4,020	1.5
TsB	Tilsit silt loam, 2 to 6 percent slopes-----	5,917	2.2
TsC	Tilsit silt loam, 6 to 12 percent slopes-----	605	0.2

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
VrB2	Vertrees silt loam, 2 to 6 percent slopes, eroded-----	1,589	0.6
VrC2	Vertrees silt loam, 6 to 12 percent slopes, eroded-----	3,610	1.4
VrD2	Vertrees silt loam, 12 to 20 percent slopes, eroded-----	1,117	0.4
VrE	Vertrees silt loam, 20 to 30 percent slopes-----	695	0.3
VtC3	Vertrees silty clay loam, 6 to 12 percent slopes, severely eroded-----	913	0.4
WeB	Wellston silt loam, 2 to 6 percent slopes-----	2,198	0.8
WeC	Wellston silt loam, 6 to 12 percent slopes-----	5,428	2.0
WeD	Wellston silt loam, 12 to 20 percent slopes-----	3,293	1.2
	Water areas more than 40 acres in size-----	3,457	1.3
	Total-----	267,424	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass- legume hay	Alfalfa hay	Pasture
		<u>Bu</u>	<u>Lb</u>	<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>
AlA----- Allegheny	I	120	2,900	40	45	5.0	6.0	9.0
AlB----- Allegheny	IIe	115	2,800	35	45	5.0	6.0	9.0
AlC----- Allegheny	IIIe	105	2,700	30	40	4.5	5.0	8.0
BaB----- Baxter	IIe	110	2,900	35	45	5.0	5.5	9.0
BaC2----- Baxter	IIIe	90	2,700	30	35	4.0	5.0	8.0
BaD2----- Baxter	IVe	75	2,200	25	30	3.5	4.5	7.0
BaE----- Baxter	VIe	---	---	---	---	---	---	5.0
BmE**: Bledsoe-Wallen-	VIe	---	---	---	---	---	---	3.5
Rock outcrop---	VIIIIs	---	---	---	---	---	---	---
CaD----- Caneyville	VIIs	---	---	---	---	---	---	4.5
CaE, CeD3----- Caneyville	VIe	---	---	---	---	---	---	4.0
CnB----- Canmer	IIe	110	2,800	35	45	4.5	5.5	9.0
CnC2----- Canmer	IIIe	90	2,400	30	40	4.5	5.0	8.0
CnD2----- Canmer	IVe	75	2,100	25	35	3.5	4.5	7.0
CnE----- Canmer	VIe	---	---	---	---	---	---	5.5
CoD3----- Canmer	VIe	---	---	---	---	---	---	5.5
CrB2----- Crider	IIe	125	3,200	40	45	5.5	6.0	9.0
CrC2----- Crider	IIIe	105	2,900	35	40	5.0	5.5	8.0
ElB----- Elk	IIe	125	3,000	40	45	5.5	6.0	9.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass- legume hay	Alfalfa hay	Pasture
		Bu	Lb	Bu	Bu	Tons	Tons	AUM*
FaB2----- Frederick	IIe	100	3,000	35	45	4.5	5.0	8.5
FaC2----- Frederick	IIIe	90	2,700	30	40	4.0	4.5	8.0
FaD2----- Frederick	IVe	75	2,200	25	35	3.0	4.0	7.0
FaE----- Frederick	VIe	---	---	---	---	---	---	6.0
FcC3----- Frederick	IVe	80	1,800	25	30	3.0	4.0	7.0
FcD3----- Frederick	VIe	---	---	---	---	---	---	6.5
FdC----- Fredonia- Hagerstown- Vertrees	IVe	80	2,000	25	30	3.5	4.5	7.0
FdC3----- Fredonia- Hagerstown- Vertrees	VIe	---	---	---	---	---	---	5.5
GaB----- Gatton	IIe	90	2,400	35	35	3.5	3.0	7.5
Gr----- Grigsby	IIw	115	2,700	35	35	4.0	5.0	8.0
HdB----- Hagerstown- Fredonia- Vertrees	IIIIs	100	2,800	35	40	4.5	5.5	8.0
JfD**: Jefferson-Lily-	IVe	---	---	---	---	---	---	5.0
Rock outcrop---	VIIIIs	---	---	---	---	---	---	---
JfE**: Jefferson-Lily-	VIe	---	---	---	---	---	---	4.0
Rock outcrop---	VIIIIs	---	---	---	---	---	---	---
La----- Lawrence	IIIw	80	1,700	35	---	3.5	---	7.0
LdC----- Lenberg	IIIe	70	1,500	20	25	2.5	3.5	5.5
LdD----- Lenberg	IVe	55	---	---	25	2.0	2.5	5.0
LdE----- Lenberg	VIe	---	---	---	---	---	---	4.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass- legume hay	Alfalfa hay	Pasture
		<u>Bu</u>	<u>Lb</u>	<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>
LlB----- Lily	IIe	95	2,400	25	30	3.5	4.0	7.0
LlC----- Lily	IIIe	70	2,000	20	25	3.0	3.5	6.0
LlD----- Lily	IVe	60	---	---	20	2.5	3.0	5.0
Ln----- Lindside	IIw	120	2,800	35	35	5.0	4.5	9.0
Me----- Melvin	Vw	---	---	---	---	---	---	4.0
Nb----- Newark	IIw	100	2,200	35	35	4.0	---	8.5
NcB----- Nicholson	IIe	100	2,500	35	35	4.5	4.0	8.0
NhB2----- Nolichucky	IIe	95	2,800	30	40	4.0	5.0	8.0
NhC2----- Nolichucky	IIIe	85	2,600	25	35	4.0	5.0	8.0
NhD2----- Nolichucky	IVe	70	2,200	20	30	3.5	4.0	6.5
No----- Nolin	IIw	125	3,000	40	40	5.5	6.0	9.0
Np----- Nolin	IIw	100	2,200	35	35	4.5	5.5	8.0
OtA----- Otwell	IIw	100	2,400	35	30	4.0	4.0	8.0
Pt**----- Pits	VIIIIs	---	---	---	---	---	---	---
RnB----- Riney	IIe	95	2,500	35	40	3.5	4.5	7.0
RnC2----- Riney	IIIe	85	2,300	30	35	3.0	4.0	6.0
RnD2----- Riney	IVe	75	2,100	25	30	2.0	3.0	5.5
RnE----- Riney	VIe	---	---	---	---	---	---	4.5
RrC2----- Riney	IIIe	80	2,300	25	35	3.0	4.0	6.0
RrD2----- Riney	IVe	70	2,000	20	30	2.0	3.0	5.5

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass- legume hay	Alfalfa hay	Pasture
		<u>Bu</u>	<u>Lb</u>	<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>
RxE:								
Rock outcrop---	VIIIIs	---	---	---	---	---	---	---
Caneyville-----	VIe	---	---	---	---	---	---	---
SnB----- Sonora	IIe	110	2,800	40	40	4.5	5.5	9.0
SnC----- Sonora	IIIe	95	2,600	35	35	4.0	5.0	8.5
TsB----- Tilsit	IIe	95	2,300	35	40	4.0	3.5	7.5
TsC----- Tilsit	IIIe	90	2,200	30	35	4.0	3.0	7.0
VrB2----- Vertrees	IIe	110	2,800	35	45	4.5	5.5	9.0
VrC2----- Vertrees	IIIe	90	2,000	30	35	4.0	5.0	8.0
VrD2----- Vertrees	IVe	75	1,800	25	30	3.0	4.0	6.0
VrE----- Vertrees	VIe	---	---	---	---	---	---	4.5
VtC3----- Vertrees	IVe	75	1,700	20	30	3.0	4.0	5.5
WeB----- Wellston	IIe	105	2,600	40	40	4.5	5.0	8.5
WeC----- Wellston	IIIe	90	2,200	30	35	4.0	4.5	8.0
WeD----- Wellston	IVe	75	1,900	20	30	3.0	4.0	6.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
I	205	---	---	---
II	42,530	31,334	11,196	---
III	67,165	64,339	277	2,549
IV	65,968	65,968	---	---
V	756	---	756	---
VI	76,527	57,476	---	19,051
VII	---	---	---	---
VIII	10,816	---	---	10,816

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that the information was not available)

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
AlA, AlB, AlC--- Allegheny	Slight	Slight	Slight	Severe	Shortleaf pine-----	80	130	Eastern white
					Yellow poplar-----	93	95	pine, yellow
					Virginia pine-----	72	112	poplar, black
					Sugar maple-----	---	---	walnut,
					White ash-----	---	---	shortleaf
					Northern red oak----	---	---	pine, white
					American elm-----	---	---	oak, white
					Red maple-----	---	---	ash, northern
					Pignut hickory-----	---	---	red oak.
BaB, BaC2----- Baxter	Slight	Slight	Slight	Severe	Black oak-----	81	63	Yellow poplar,
					White oak-----	74	56	eastern white
					Northern red oak----	---	---	pine,
					Yellow poplar-----	92	93	shortleaf
					Hickory-----	---	---	pine, white
					Sugar maple-----	---	---	ash, white
					Southern red oak----	71	53	oak, northern
BaD2, BaE----- Baxter	Moderate	Moderate	Slight	Severe	Black oak-----	81	63	Yellow poplar,
					White oak-----	74	56	eastern white
					Northern red oak----	---	---	pine,
					Yellow poplar-----	92	93	shortleaf
					Hickory-----	---	---	pine, white
					Sassafras-----	---	---	ash, white
BmE**: Bledsoe----- (Warm aspect)	Moderate	Moderate	Moderate	Moderate	Sugar maple-----	---	---	oak, northern
								red oak,
								loblolly pine.
					Black oak-----	81	63	Yellow poplar,
					White oak-----	74	56	eastern white
					Northern red oak----	---	---	pine,
BmE**: Bledsoe----- (Cool aspect)	Moderate	Moderate	Slight	Severe	Yellow poplar-----	84	79	White oak,
					Virginia pine-----	---	---	white ash.
					Pignut hickory-----	---	---	
					Shagbark hickory----	---	---	
					Sassafras-----	---	---	
					Black locust-----	---	---	
Wallen-----	Moderate	Moderate	Moderate	Moderate	Blackgum-----	---	---	
					Black oak-----	50	34	Loblolly pine,
					Shortleaf pine-----	50	68	shortleaf
Rock outcrop.	Moderate	Moderate	Moderate	Moderate	Virginia pine-----	55	80	pine, Virginia
								pine.
BmE**: Bledsoe----- (Cool aspect)	Moderate	Moderate	Slight	Severe	Yellow poplar-----	104	114	Yellow poplar,
					Black walnut-----	---	---	white ash,
					White ash-----	---	---	white oak,
					Slippery elm-----	---	---	northern red
					Sugar maple-----	---	---	oak.
Rock outcrop.	Moderate	Moderate	Moderate	Moderate	Black cherry-----	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Common trees	Site index	Volume*	
BmE**:								
Wallen-----	Moderate	Moderate	Moderate	Moderate	Black oak-----	60	43	Loblolly pine, shortleaf pine, eastern white pine.
					Shortleaf pine-----	60	88	
					Virginia pine-----	65	100	
Rock outcrop.								
CaD, CaE-----	Severe	Moderate	Slight	Severe	Black oak-----	71	53	White oak, yellow poplar, white ash, eastern white pine, northern red oak.
Caneyville					White oak-----	64	47	
(Cool aspect)					Sugar maple-----	---	---	
					Hickory-----	---	---	
					White ash-----	---	---	
					Eastern redcedar---	46	54	
					Yellow poplar-----	90	90	
CaD, CaE-----	Severe	Moderate	Moderate	Severe	Black oak-----	65	47	Virginia pine, eastern redcedar, white oak.
Caneyville					White oak-----	60	43	
(Warm aspect)					Sugar maple-----	---	---	
					Hickory-----	---	---	
					Eastern redcedar---	36	38	
					Chinkapin oak-----	51	35	
					Scarlet oak-----	53	37	
CeD3-----	Moderate	Moderate	Moderate	Moderate	Black oak-----	65	47	Virginia pine, eastern redcedar.
Caneyville					White oak-----	63	43	
					Hickory-----	---	---	
					Eastern redcedar---	36	38	
CnB, CnC2-----	Slight	Slight	Slight	Severe	Yellow poplar-----	85	81	Yellow poplar, shortleaf pine, eastern white pine, white oak.
Canmer					White oak-----	75	57	
					Southern red oak---	70	52	
					Virginia pine-----	76	117	
					Sugar maple-----	---	---	
					Hickory-----	---	---	
					Black oak-----	---	---	
					Shortleaf pine-----	78	126	
CnD2, CnE, CoD3-	Moderate	Moderate	Slight	Severe	Yellow poplar-----	85	81	Yellow poplar, shortleaf pine, eastern white pine, white oak.
Canmer					White oak-----	75	57	
					Southern red oak---	70	52	
					Virginia pine-----	76	117	
					Sugar maple-----	---	---	
					Hickory-----	---	---	
					Black oak-----	---	---	
					Shortleaf pine-----	78	126	
CrB2, CrC2-----	Slight	Slight	Slight	Severe	Yellow poplar-----	97	102	Eastern white pine, yellow poplar, black walnut, loblolly pine, white ash, northern red oak, white oak, shortleaf pine.
Crider					Sugar maple-----	---	---	
					Black oak-----	84	66	
					White ash-----	---	---	
					Black walnut-----	---	---	
					White oak-----	72	54	
					Hickory-----	---	---	
					Northern red oak---	84	66	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
ElB----- Elk	Slight	Slight	Slight	Severe	Yellow poplar----- Cherrybark oak----- Pin oak----- Hackberry----- Red maple----- American sycamore----- Black walnut-----	91 95 96 --- --- --- ---	92 133 93 --- --- --- ---	Eastern white pine, yellow poplar, black walnut, loblolly pine, white oak, northern red oak, cherrybark oak, white ash, shortleaf pine.
FaB2, FaC2----- Frederick	Slight	Moderate	Moderate	Severe	Black oak----- Yellow poplar----- White oak----- Virginia pine-----	83 95 76 68	65 98 59 105	Eastern white pine, yellow poplar, white ash, northern red oak.
FaD2----- Frederick (Warm aspect)	Moderate	Moderate	Moderate	Severe	Black oak----- White oak----- Scarlet oak-----	74 61 66	56 44 48	Eastern white pine, white ash.
FaD2----- Frederick (Cool aspect)	Moderate	Moderate	Moderate	Severe	Black oak----- Yellow poplar----- White oak-----	83 95 76	65 98 59	Eastern white pine, yellow poplar, white ash, northern red oak.
FaE----- Frederick (Warm aspect)	Moderate	Moderate	Moderate	Severe	Black oak----- White oak----- Scarlet oak-----	74 61 66	56 44 48	Eastern white pine, white oak.
FaE----- Frederick (Cool aspect)	Moderate	Moderate	Moderate	Severe	Black oak----- Yellow poplar----- White oak----- Virginia pine-----	83 95 76 68	65 98 59 105	Eastern white pine, yellow poplar, white ash, northern red oak.
FcC3----- Frederick	Slight	Moderate	Moderate	Moderate	Black oak----- Yellow poplar----- White oak-----	76 86 76	58 82 58	Eastern white pine, yellow poplar, white ash, northern red oak.
FcD3----- Frederick (Warm aspect)	Moderate	Moderate	Moderate	Moderate	Black oak----- White oak----- Scarlet oak-----	66 61 66	56 44 48	Eastern white pine, white ash.
FcD3----- Frederick (Cool aspect)	Moderate	Moderate	Moderate	Moderate	Black oak----- Yellow poplar----- White oak-----	76 86 76	58 82 58	Eastern white pine, yellow poplar, white ash, northern red oak.
FdC**: Fredonia-----	Slight	Moderate	Slight	Moderate	Black oak----- Eastern redcedar----- Southern red oak----	72 --- 70	52 --- 52	Virginia pine, eastern redcedar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Common trees	Site index	Volume*	
FdC**:								
Hagerstown-----	Slight	Moderate	Slight	Moderate	White oak-----	70	52	Virginia pine,
					Loblolly pine-----	80	110	eastern white
					Virginia pine-----	70	109	pine, loblolly
								pine.
Vertrees-----	Slight	Moderate	Slight	Moderate	Yellow poplar-----	90	90	Yellow poplar,
					White oak-----	80	62	white ash,
					Chinkapin oak-----	---	---	eastern white
					Black oak-----	80	62	pine, white
					Hickory-----	---	---	oak, northern
					Sugar maple-----	---	---	red oak.
					American elm-----	---	---	
FdC3**:								
Fredonia-----	Moderate	Moderate	Slight	Moderate	Northern red oak----	60	43	Virginia pine,
					Eastern redcedar----	40	43	eastern
								redcedar.
Hagerstown-----	Slight	Moderate	Slight	Moderate	White oak-----	60	43	Virginia pine,
					Loblolly pine-----	70	93	eastern white
					Sweetgum-----	70	57	pine, loblolly
					Virginia pine-----	60	91	pine,
								sweetgum.
Vertrees-----	Slight	Moderate	Moderate	Moderate	White oak-----	70	52	White ash,
					Chinkapin oak-----	---	---	white oak,
					Black oak-----	70	52	eastern white
					Scarlet oak-----	70	52	pine, northern
					Eastern redcedar----	---	---	red oak.
GaB-----	Slight	Slight	Slight	Severe	Yellow poplar-----	85	81	Yellow poplar,
Gatton					White oak-----	70	52	loblolly pine,
					Red maple-----	---	---	eastern white
					Chinkapin oak-----	---	---	pine,
					Black oak-----	---	---	shortleaf
					Hickory-----	---	---	pine, white
								oak.
Gr-----	Slight	Slight	Moderate	Severe	Yellow poplar-----	110	124	Yellow poplar,
Grigsby					Northern red oak----	85	67	black walnut,
					White oak-----	85	67	eastern white
					Black walnut-----	---	---	pine,
					American sycamore----	---	---	shortleaf
					Sweetgum-----	---	---	pine, white
					Red maple-----	---	---	oak, northern
					Hickory-----	---	---	red oak.
HdB**:								
Hagerstown-----	Slight	Moderate	Slight	Severe	Northern red oak----	85	67	Yellow poplar,
					Yellow poplar-----	95	98	white oak,
					Hickory-----	---	---	eastern white
								pine, northern
								red oak.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
HdB**:								
Fredonia-----	Slight	Moderate	Slight	Severe	Black oak-----	70	52	White oak,
					Eastern redcedar----	---	---	eastern white
					Southern red oak----	70	52	pine, white ash.
Vertrees-----	Slight	Moderate	Slight	Severe	Yellow poplar-----	90	90	Yellow poplar,
					White oak-----	80	62	white ash,
					Chinkapin oak-----	---	---	eastern white
					Black oak-----	80	62	pine, white
					Hickory-----	---	---	oak, northern
					Sugar maple-----	---	---	red oak.
					American elm-----	---	---	
JfD, JfE**:								
Jefferson-----	Moderate	Moderate	Moderate	Severe	White oak-----	70	52	Shortleaf pine,
(Warm aspect)					Virginia pine-----	---	---	white oak,
					Chestnut oak-----	63	46	loblolly pine.
					Scarlet oak-----	82	64	
					Black oak-----	82	64	
Lily-----	Moderate	Moderate	Moderate	Moderate	Shortleaf pine-----	63	95	Shortleaf pine,
					Virginia pine-----	72	112	white oak,
					Scarlet oak-----	73	55	eastern white
					White oak-----	69	51	pine, loblolly
					Black oak-----	80	62	pine, northern
					Southern red oak----	65	47	red oak.
					Hickory-----	---	---	
					Red maple-----	---	---	
Rock outcrop.								
JfD, JfE**:								
Jefferson-----	Moderate	Moderate	Slight	Severe	White oak-----	84	66	Yellow poplar,
(Cool aspect)					Yellow poplar-----	102	110	loblolly pine,
					Shortleaf pine-----	80	130	eastern white
					Chestnut oak-----	82	64	pine, northern
								red oak,
								shortleaf
								pine, white
								oak, black
								walnut.
Lily-----	Moderate	Moderate	Slight	Moderate	Shortleaf pine-----	63	95	Shortleaf pine,
					Virginia pine-----	72	112	white oak,
					Black oak-----	80	62	eastern white
					White oak-----	69	51	pine, loblolly
					Chestnut oak-----	76	58	pine, northern
					Southern red oak----	65	47	red oak.
					Scarlet oak-----	73	55	
					Hickory-----	---	---	
					Red maple-----	---	---	
Rock outcrop.								

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
La----- Lawrence	Slight	Moderate	Moderate	Severe	Yellow poplar-----	85	81	Yellow poplar, green ash, American sycamore, white oak, loblolly pine, sweetgum, willow oak, eastern white pine.
					Sweetgum-----	89	103	
					White oak-----	74	56	
					Black oak-----	78	60	
					Red maple-----	---	---	
					Pin oak-----	---	---	
					Hackberry-----	---	---	
LdC----- Lenberg	Slight	Slight	Slight	Moderate	Virginia pine-----	61	93	Shortleaf pine, Virginia pine, loblolly pine, white oak.
					White oak-----	62	45	
					Hickory-----	---	---	
					Chestnut oak-----	56	39	
					Scarlet oak-----	66	48	
					Black oak-----	60	43	
					Post oak-----	46	31	
LdD----- Lenberg	Moderate	Moderate	Slight	Moderate	Virginia pine-----	61	93	Shortleaf pine, Virginia pine, loblolly pine, white oak.
					White oak-----	62	45	
					Hickory-----	---	---	
					Chestnut oak-----	56	39	
					Scarlet oak-----	66	48	
					Black oak-----	60	43	
					Post oak-----	46	31	
LdE----- Lenberg	Severe	Severe	Slight	Moderate	Virginia pine-----	61	93	Shortleaf pine, Virginia pine, loblolly pine, white oak.
					White oak-----	62	45	
					Hickory-----	---	---	
					Chestnut oak-----	56	39	
					Scarlet oak-----	66	48	
					Black oak-----	60	43	
					Post oak-----	46	31	
LlB, LlC----- Lily	Slight	Moderate	Slight	Moderate	Shortleaf pine-----	63	95	Shortleaf pine, white oak, eastern white pine, yellow poplar, northern red oak.
					Virginia pine-----	72	112	
					Black oak-----	80	62	
					White oak-----	69	51	
					Chestnut oak-----	76	58	
					Southern red oak----	65	47	
					Scarlet oak-----	73	55	
LlD----- Lily	Moderate	Moderate	Slight	Moderate	Shortleaf pine-----	63	95	Shortleaf pine, white oak, eastern white pine, yellow poplar, northern red oak.
					Virginia pine-----	72	112	
					Black oak-----	80	62	
					White oak-----	69	51	
					Chestnut oak-----	76	58	
					Southern red oak----	65	47	
					Scarlet oak-----	73	55	
Ln----- Lindside	Slight	Slight	Moderate	Severe	Northern red oak----	86	68	Eastern white pine, yellow poplar, black walnut, northern red oak, shortleaf pine, white ash, white oak.
					Yellow poplar-----	95	98	
					Black walnut-----	---	---	
					White ash-----	---	---	
					White oak-----	85	67	
					Red maple-----	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
Me----- Melvin	Slight	Severe	Severe	Severe	Pin oak----- Red maple----- Eastern cottonwood-- Hickory----- Hackberry----- American sycamore--- Black willow-----	100 --- 101 --- --- --- ---	98 --- 130 --- --- --- ---	Baldcypress, sweetgum, pin oak, willow oak, American sycamore, green ash.
Nb----- Newark	Slight	Moderate	Moderate	Severe	Pin oak----- Eastern cottonwood-- Sweetgum----- Green ash----- Cherrybark oak----- Shumard oak----- Overcup oak-----	100 94 85 --- --- --- ---	98 113 93 --- --- --- ---	Eastern cottonwood, sweetgum, American sycamore, green ash.
NcB----- Nicholson	Moderate	Slight	Slight	Severe	Black oak----- White oak----- Hickory----- Sweetgum----- Yellow poplar-----	78 74 --- 84 107	60 56 --- 90 119	White oak, northern red oak, sweetgum, yellow poplar, eastern white pine.
NhB2, NhC2----- Nolichucky	Slight	Slight	Slight	Severe	Yellow poplar----- Southern red oak--- Shortleaf pine----- Virginia pine----- White oak-----	90 70 70 70 ---	90 52 110 109 ---	Yellow poplar, white ash, eastern white pine, loblolly pine, black walnut, shortleaf pine, white oak.
NhD2----- Nolichucky (Warm aspect)	Moderate	Moderate	Moderate	Severe	Shortleaf pine----- Virginia pine----- Southern red oak--- White oak-----	65 65 --- ---	99 100 --- ---	Loblolly pine, shortleaf pine, white oak.
NhD2----- Nolichucky (Cool aspect)	Moderate	Moderate	Slight	Severe	Yellow poplar----- Southern red oak--- Shortleaf pine----- Virginia pine-----	90 70 70 70	90 52 110 109	Yellow poplar, eastern white pine, loblolly pine, shortleaf pine.
No----- Nolin	Slight	Slight	Slight	Severe	Yellow poplar----- Sweetgum----- Cherrybark oak----- Eastern cottonwood-- Black walnut----- American sycamore--- River birch-----	107 92 97 --- --- --- ---	119 112 140 --- --- --- ---	Yellow poplar, eastern white pine, eastern cottonwood, white ash, cherrybark oak, sweetgum, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Volume*	
Np----- Nolin	Slight	Moderate	Moderate	Severe	Sweetgum----- Cherrybark oak----- Eastern cottonwood-- River birch----- Black willow----- American sycamore---	92 97 --- --- --- ---	112 140 --- --- --- ---	Eastern cottonwood, green ash, black walnut, cherrybark oak, sweetgum, eastern white pine, yellow poplar.
OtA----- Otwell	Slight	Slight	Slight	Severe	White oak----- Yellow poplar----- Sugar maple----- Black oak-----	69 95 --- 72	51 98 --- 54	Eastern white pine, yellow poplar, white ash, white oak.
RnB, RnC2----- Riney	Slight	Moderate	Slight	Severe	Yellow poplar----- White oak----- Red maple----- Chinkapin oak----- Black oak-----	93 78 --- 74 80	95 60 --- 56 62	Yellow poplar, white ash, loblolly pine, black walnut, eastern white pine.
RnD2, RnE----- Riney	Moderate	Moderate	Slight	Severe	Yellow poplar----- White oak----- Red maple----- Chinkapin oak----- Black oak-----	93 78 --- 74 80	95 60 --- 56 62	Yellow poplar, white ash, loblolly pine, black walnut, eastern white pine.
RrC2----- Riney	Slight	Moderate	Slight	Severe	Yellow poplar----- White oak----- Red maple----- Chinkapin oak----- Black oak-----	93 78 --- 74 80	95 60 --- 56 62	Yellow poplar, white ash, loblolly pine, black walnut, eastern white pine.
RrD2----- Riney	Moderate	Moderate	Slight	Severe	Yellow poplar----- White oak----- Red maple----- Chinkapin oak----- Black oak-----	93 78 --- 74 80	95 60 --- 56 62	Yellow poplar, white ash, loblolly pine, black walnut, eastern white pine.
RxE**: Rock outcrop.								
Caneyville----- (Warm aspect)	Severe	Moderate	Moderate	Severe	Black oak----- White oak----- Sugar maple----- Hickory----- Eastern redcedar---- Chinkapin oak----- Scarlet oak-----	65 60 --- --- 36 44 50	47 43 --- --- 38 29 34	Virginia pine, eastern redcedar, white oak, loblolly pine.
RxE**: Rock outcrop.								

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Common trees	Site index	Volume*	
RxE**: Caneyville----- (Cool aspect)	Severe	Moderate	Slight	Severe	Black oak----- White oak----- Sugar maple----- Hickory----- White ash----- Eastern redcedar--- Yellow poplar----- Scarlet oak-----	71 64 --- --- --- 46 90 57	53 47 --- --- --- 54 90 40	White oak, yellow poplar, white ash, eastern white pine, northern red oak, loblolly pine.
SnB, SnC----- Sonora	Slight	Slight	Slight	Severe	Shortleaf pine----- Yellow poplar----- White oak----- Black oak----- Hickory----- Sugar maple----- Sassafras----- Persimmon-----	80 90 80 80 --- --- --- ---	130 90 62 62 --- --- --- ---	Yellow poplar, shortleaf pine, eastern white pine, black walnut, white oak, northern red oak.
TsB, TsC----- Tilsit	Slight	Slight	Slight	Severe	Shortleaf pine----- White oak----- Yellow poplar----- Black oak----- Virginia pine----- Scarlet oak----- Hickory----- Red maple----- Southern red oak----	72 68 90 74 73 74 --- --- 65	114 50 90 56 113 56 --- --- 47	Eastern white pine, shortleaf pine, white oak, yellow poplar, loblolly pine.
VrB2, VrC2----- Vertrees	Slight	Moderate	Slight	Severe	Yellow poplar----- White oak----- Chinkapin oak----- Black oak----- Hickory----- Sugar maple----- American elm-----	90 80 --- 80 --- --- ---	90 62 --- 62 --- --- ---	Yellow poplar, white ash, eastern white pine, white oak, northern red oak.
VrD2, VrE----- Vertrees	Moderate	Moderate	Slight	Severe	Yellow poplar----- White oak----- Chinkapin oak----- Black oak----- Hickory----- Sugar maple----- American elm-----	90 80 --- 80 --- --- ---	90 62 --- 62 --- --- ---	Yellow poplar, white ash, eastern white pine, white oak, northern red oak.
VtC3----- Vertrees	Slight	Moderate	Moderate	Moderate	White oak----- Chinkapin oak----- Black oak----- Scarlet oak----- Eastern redcedar----	70 --- 70 70 ---	52 --- 52 52 ---	White ash, white oak, eastern white pine.
WeB, WeC----- Wellston	Slight	Slight	Slight	Severe	Black oak----- Yellow poplar----- Virginia pine----- White oak----- Black walnut----- Sugar maple----- White ash----- Chestnut oak-----	82 93 68 74 --- --- --- 78	64 95 105 56 --- --- --- 60	Eastern white pine, black walnut, yellow poplar, white oak, northern red oak, white ash.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Common trees	Site index	Volume*	
WeD----- Wellston (Cool aspect)	Moderate	Moderate	Moderate	Severe	Northern red oak----	82	64	Eastern white
					Yellow poplar-----	93	95	pine, black
					Virginia pine-----	68	105	walnut, yellow
					White oak-----	---	---	poplar, white
					Black walnut-----	---	---	oak, northern
					Black cherry-----	---	---	red oak,
					Sugar maple-----	---	---	shortleaf
					White ash-----	---	---	pine, white
					Chestnut oak-----	78	60	ash, loblolly
								pine.
WeD----- Wellston (Warm aspect)	Moderate	Moderate	Slight	Severe	Black oak-----	73	55	White oak,
					Virginia pine-----	---	---	loblolly pine,
					White oak-----	69	51	shortleaf
					Black cherry-----	---	---	pine.
					Sugar maple-----	---	---	
					White ash-----	---	---	
					Scarlet oak-----	71	53	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AlA----- Allegheny	Severe: flooding.	Slight-----	Moderate: small stones.	Slight-----	Slight.
AlB----- Allegheny	Severe: flooding.	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
AlC----- Allegheny	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
BaB----- Baxter	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight-----	Moderate: small stones.
BaC2----- Baxter	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight-----	Moderate: small stones, slope.
BaD2----- Baxter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
BaE----- Baxter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
BmE*: Bledsoe-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Wallen-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
CaD----- Caneyville	Moderate: percs slowly, depth to rock.	Moderate: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
CaE----- Caneyville	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
CeD3----- Caneyville	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
CnB----- Canmer	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
CnC2----- Canmer	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CnD2----- Canmer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CnE----- Canmer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoD3----- Canmer	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CrB2----- Crider	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
CrC2----- Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
ElB----- Elk	Severe: flooding.	Slight-----	Moderate: slope.	Severe: erodes easily.	Slight.
FaB2----- Frederick	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
FaC2----- Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
FaD2----- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FaE----- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FcC3----- Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
FcD3----- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FdC*, FdC3*: Fredonia-----	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Hagerstown-----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
Vertrees-----	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GaB----- Gatton	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Gr----- Grigsby	Severe: flooding.	Slight-----	Moderate: small stones, flooding.	Slight-----	Moderate: flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HdB*: Hagerstown-----	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Moderate: large stones.
Fredonia-----	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
Vertrees-----	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight-----	Slight.
JfD*: Jefferson-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Lily-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rock outcrop.					
JfE*: Jefferson-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Lily-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
La----- Lawrence	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness, flooding.
LdC----- Lenberg	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
LdD----- Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LdE----- Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
LlB----- Lily	Slight-----	Slight-----	Moderate: slope, depth to rock.	Slight-----	Moderate: depth to rock.
LlC----- Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope, depth to rock.
LlD----- Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Ln----- Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Me----- Melvin	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Nb----- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
NcB----- Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
NhB2----- Nolichucky	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
NhC2----- Nolichucky	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
NhD2----- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
No----- Nolin	Severe: flooding.	Slight-----	Slight-----	Severe: erodes easily.	Moderate: flooding.
Np----- Nolin	Severe: flooding.	Moderate: flooding.	Slight-----	Severe: erodes easily.	Severe: flooding.
OtA----- Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight-----	Slight.
Pt*. Pits					
RnB----- Riney	Slight-----	Slight-----	Moderate: slope, small stones.	Slight-----	Slight.
RnC2----- Riney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
RnD2----- Riney	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RnE----- Riney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RrC2----- Riney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
RrD2----- Riney	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RxE*: Rock outcrop.					
Caneyville-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SnB----- Sonora	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
SnC----- Sonora	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
TsB----- Tilsit	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
TsC----- Tilsit	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
VrB2----- Vertrees	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight-----	Slight.
VrC2----- Vertrees	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
VrD2----- Vertrees	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VrE----- Vertrees	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VtC3----- Vertrees	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Slight-----	Moderate: slope.
WeB----- Wellston	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
WeC----- Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WeD----- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AlA----- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlB----- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlC----- Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaB----- Baxter	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BaC2----- Baxter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaD2----- Baxter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BaE----- Baxter	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BmE*: Bledsoe-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wallen----- Rock outcrop.	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CaD, CaE----- Caneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CeD3----- Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnB----- Canmer	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnC2----- Canmer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnD2----- Canmer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnE----- Canmer	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoD3----- Canmer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrB2----- Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC2----- Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ElB----- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaB2----- Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaC2----- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FaD2----- Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FaE----- Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FcC3----- Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FcD3----- Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FdC*, FdC3*: Fredonia-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hagerstown-----	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Vertrees-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaB----- Gatton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gr----- Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HdB*: Hagerstown-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Fredonia-----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Vertrees-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
JfD*: Jefferson-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lily-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
JfE*: Jefferson-----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lily-----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
JfE*: Rock outcrop.										
La----- Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LdC----- Lenberg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LdD----- Lenberg	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LdE----- Lenberg	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LlB----- Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LlC----- Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LlD----- Lily	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ln----- Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Me----- Melvin	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Nb----- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NcB----- Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NhB2----- Nolichucky	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NhC2----- Nolichucky	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NhD2----- Nolichucky	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
No----- Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Np----- Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
OtA----- Otwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pt*. Pits										
RnB----- Riney	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
RnC2----- Riney	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RnD2----- Riney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RnE----- Riney	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RrC2----- Riney	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RrD2----- Riney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RxE*: Rock outcrop.										
Caneyville-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
SnB----- Sonora	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SnC----- Sonora	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TsB----- Tilsit	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TsC----- Tilsit	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VrB2----- Vertrees	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VrC2----- Vertrees	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VrD2, VrE----- Vertrees	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VtC3----- Vertrees	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB----- Wellston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeC----- Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeD----- Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AlA, AlB----- Allegheny	Slight-----	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
AlC----- Allegheny	Moderate: slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Moderate: slope, flooding.	Moderate: slope.
BaB----- Baxter	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
BaC2----- Baxter	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
BaD2, BaE----- Baxter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
BmE*: Bledsoe-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Wallen----- Rock outcrop.	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
CaD----- Caneyville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: low strength, depth to rock.	Severe: depth to rock.
CaE----- Caneyville	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: low strength, slope, depth to rock.	Severe: slope, depth to rock.
CeD3----- Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
CnB----- Canmer	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
CnC2----- Canmer	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
CnD2, CnE, CoD3--- Canmer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CrB2----- Crider	Moderate: too clayey.	Slight-----	Slight-----	Moderate: slope.	Severe: low strength.	Slight.
CrC2----- Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
ElB----- Elk	Moderate: too clayey.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
FaB2----- Frederick	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
FaC2----- Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
FaD2, FaE----- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FcC3----- Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
FcD3----- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FdC*, FdC3*: Fredonia-----	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
Hagerstown-----	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Vertrees-----	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
GaB----- Gatton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
Gr----- Grigsby	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
HdB*: Hagerstown-----	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HdB*: Fredonia-----	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: depth to rock.
Vertrees-----	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
JfD*, JfE*: Jefferson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily-----	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
La----- Lawrence	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Moderate: wetness, flooding.
LdC----- Lenberg	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
LdD, LdE----- Lenberg	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope.
LlB----- Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
LlC----- Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, depth to rock.
LlD----- Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ln----- Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Me----- Melvin	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.
Nb----- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NcB----- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
NhB2----- Nolichucky	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength.	Slight.
NhC2----- Nolichucky	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
NhD2----- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
No----- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Np----- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OtA----- Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Slight.
Pt*. Pits						
RnB----- Riney	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
RnC2----- Riney	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
RnD2, RnE----- Riney	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RrC2----- Riney	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
RrD2----- Riney	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RxE*: Rock outcrop.						
Caneyville-----	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: low strength, slope, depth to rock.	Severe: slope, depth to rock.
SnB----- Sonora	Moderate: too clayey.	Slight-----	Moderate: shrink-swell.	Moderate: slope.	Severe: low strength.	Slight.
SnC----- Sonora	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TsB----- Tilsit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Moderate: wetness.
TsC----- Tilsit	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope, wetness.
VrB2----- Vertrees	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
VrC2----- Vertrees	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
VrD2, VrE----- Vertrees	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
VtC3----- Vertrees	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
WeB----- Wellston	Moderate: depth to rock.	Slight-----	Moderate: depth to rock.	Moderate: slope.	Severe: low strength.	Slight.
WeC----- Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
WeD----- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AlA----- Allegheny	Moderate: flooding.	Moderate: seepage.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
AlB----- Allegheny	Moderate: flooding.	Moderate: seepage, slope.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
AlC----- Allegheny	Moderate: flooding, slope.	Severe: slope.	Moderate: flooding, slope, too clayey.	Moderate: flooding, slope.	Fair: too clayey, slope.
BaB----- Baxter	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
BaC2----- Baxter	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BaD2, BaE----- Baxter	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
BmE*: Bledsoe-----	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Wallen----- Rock outcrop.	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
CaD----- Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: too clayey, depth to rock.
CaE----- Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
CeD3----- Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CnB----- Canmer	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
CnC2----- Canmer	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
CnD2, CnE, CoD3----- Canmer	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CrB2----- Crider	Slight-----	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
CrC2----- Crider	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
ElB----- Elk	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey, thin layer.
FaB2----- Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
FaC2----- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
FaD2, FaE----- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
FcC3----- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
FcD3----- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
FdC*, FdC3*: Fredonia-----	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Hagerstown-----	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Vertrees-----	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GaB----- Gatton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness, too clayey.
Gr----- Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
HdB*: Hagerstown-----	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Fredonia-----	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Vertrees-----	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
JfD*, JfE*: Jefferson-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Lily-----	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Rock outcrop.					
La----- Lawrence	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
LdC----- Lenberg	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
LdD, LdE----- Lenberg	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, slippage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope, slippage.	Poor: depth to rock, too clayey, hard to pack.
LlB----- Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
LlC----- Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LlD----- Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Ln----- Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Me----- Melvin	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
Nb----- Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NcB----- Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
NhB2----- Nolichucky	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey, small stones.
NhC2----- Nolichucky	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, small stones.
NhD2----- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
No, Np----- Nolin	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
OtA----- Otwell	Severe: wetness, percs slowly.	Slight-----	Moderate: flooding, wetness.	Moderate: flooding, wetness.	Fair: too clayey, wetness.
RnB----- Riney	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: depth to rock, too clayey.
RnC2----- Riney	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: depth to rock, too clayey, slope.
RnD2, RnE----- Riney	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
RrC2----- Riney	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: depth to rock, too clayey, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RrD2----- Riney	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
RxE*: Rock outcrop.					
Caneyville-----	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
SnB----- Sonora	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
SnC----- Sonora	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
TsB----- Tilsit	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock.	Fair: wetness, too clayey.
TsC----- Tilsit	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock, wetness.	Moderate: slope, wetness, depth to rock.	Fair: slope, too clayey, wetness.
VrB2----- Vertrees	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey, hard to pack.
VrC2----- Vertrees	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
VrD2, VrE----- Vertrees	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack.
VtC3----- Vertrees	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
WeB----- Wellston	Moderate: seepage, depth to rock.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Slight-----	Fair: depth to rock, too clayey.
WeC----- Wellston	Moderate: seepage, slope, depth to rock.	Severe: slope.	Severe: depth to rock, seepage.	Moderate: slope.	Fair: depth to rock, too clayey, slope.
WeD----- Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AlA, AlB----- Allegheny	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
AlC----- Allegheny	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
BaB, BaC2----- Baxter	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BaD2----- Baxter	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BaE----- Baxter	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BmE*: Bledsoe-----	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wallen----- Rock outcrop.	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, slope.
CaD----- Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, depth to rock.
CaE----- Caneyville	Poor: low strength, slope, depth to rock.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, slope, depth to rock.
CeD3----- Caneyville	Poor: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
CnB, CnC2----- Canmer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CnD2----- Canmer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CnE----- Canmer	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CoD3----- Canmer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CrB2----- Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CrC2----- Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
ElB----- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
FaB2, FaC2----- Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FaD2----- Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FaE----- Frederick	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FcC3----- Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FcD3----- Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FdC*, FdC3*: Fredonia-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Hagerstown-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Vertrees-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GaB----- Gatton	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Gr----- Grigsby	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
HdB*: Hagerstown-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HdB*: Fredonia-----	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Vertrees-----	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
JfD*: Jefferson-----	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lily-----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
JfE*: Jefferson-----	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lily-----	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
La----- Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LdC----- Lenberg	Poor: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LdD----- Lenberg	Poor: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
LdE----- Lenberg	Poor: low strength, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
LlB, LlC----- Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
LlD----- Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ln----- Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Me----- Melvin	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Nb----- Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NcB----- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
NhB2, NhC2----- Nolichucky	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
NhD2----- Nolichucky	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
No, Np----- Nolin	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
OtA----- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Pt*, Pits				
RnB, RnC2----- Riney	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
RnD2----- Riney	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
RnE----- Riney	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
RrC2----- Riney	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
RrD2----- Riney	Fair: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
RxE*: Rock outcrop.				
Caneyville-----	Poor: low strength, depth to rock.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, slope, depth to rock.
SnB----- Sonora	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
SnC----- Sonora	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TsB----- Tilsit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too clayey.
TsC----- Tilsit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones, too clayey.
VrB2, VrC2----- Vertrees	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
VrD2----- Vertrees	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
VrE----- Vertrees	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
VtC3----- Vertrees	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WeB, WeC----- Wellston	Fair: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
WeD----- Wellston	Fair: low strength, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AlA----- Allegheny	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable-----	Favorable.
AlB----- Allegheny	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable-----	Favorable.
AlC----- Allegheny	Severe: slope.	Severe: piping.	Deep to water----	Slope-----	Slope.
BaB----- Baxter	Moderate: seepage.	Moderate: hard to pack.	Deep to water----	Favorable-----	Favorable.
BaC2, BaD2----- Baxter	Moderate: seepage.	Moderate: hard to pack.	Deep to water----	Slope-----	Slope.
BaE----- Baxter	Severe: slope.	Moderate: hard to pack.	Deep to water----	Slope-----	Slope.
BmE*: Bledsoe-----	Severe: slope.	Moderate: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Wallen----- Rock outcrop.	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, droughty.
CaD----- Caneyville	Severe: depth to rock.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CaE----- Caneyville	Severe: slope, depth to rock.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CeD3----- Caneyville	Moderate: depth to rock, slope.	Moderate: hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CnB----- Canmer	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water----	Favorable-----	Favorable.
CnC2, CnD2, CnE, CoD3----- Canmer	Severe: slope.	Severe: piping, hard to pack.	Deep to water----	Slope-----	Slope.
CrB2----- Crider	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable-----	Favorable.
CrC2----- Crider	Moderate: seepage.	Severe: piping.	Deep to water----	Slope-----	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ElB----- Elk	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
FaB2----- Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water----	Favorable-----	Favorable.
FaC2, FaD2, FaE, FcC3, FcD3----- Frederick	Severe: slope.	Severe: hard to pack.	Deep to water----	Slope-----	Slope.
FdC*, FdC3*: Fredonia-----	Severe: slope.	Severe: hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Hagerstown-----	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water----	Slope-----	Slope.
Vertrees-----	Slight-----	Severe: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
GaB----- Gatton	Moderate: seepage.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Gr----- Grigsby	Severe: seepage.	Severe: piping.	Deep to water----	Favorable-----	Favorable.
HdB*: Hagerstown-----	Moderate: seepage, depth to rock, slope.	Moderate: hard to pack.	Deep to water----	Favorable-----	Favorable.
Fredonia-----	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water----	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Vertrees-----	Slight-----	Severe: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
JfD*: Jefferson-----	Severe: seepage.	Severe: piping.	Deep to water----	Slope-----	Slope.
Lily-----	Severe: seepage.	Severe: piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.					
JfE*: Jefferson-----	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope-----	Slope.
Lily-----	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
JfE*: Rock outcrop.					
La----- Lawrence	Slight-----	Severe: piping.	Percs slowly, flooding.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
LdC, LdD----- Lenberg	Moderate: depth to rock.	Moderate: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
LdE----- Lenberg	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
LlB----- Lily	Severe: seepage.	Severe: piping.	Deep to water----	Depth to rock----	Depth to rock.
LlC, LlD----- Lily	Severe: seepage.	Severe: piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
Ln----- Lindside	Moderate: seepage.	Severe: piping.	Flooding-----	Wetness, erodes easily.	Erodes easily.
Me----- Melvin	Moderate: seepage.	Severe: piping, ponding.	Ponding, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
Nb----- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding-----	Erodes easily, wetness.	Wetness, erodes easily.
NcB----- Nicholson	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
NhB2----- Nolichucky	Moderate: seepage.	Slight-----	Deep to water----	Favorable-----	Favorable.
NhC2, NhD2----- Nolichucky	Moderate: seepage.	Slight-----	Deep to water----	Slope-----	Slope.
No, Np----- Nolin	Severe: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
OtA----- Otwell	Slight-----	Moderate: wetness.	Percs slowly----	Erodes easily, wetness.	Erodes easily, rooting depth.
Pt*. Pits					
RnB----- Riney	Severe: seepage.	Severe: piping.	Deep to water----	Favorable-----	Favorable.
RnC2, RnD2, RnE, RrC2, RrD2----- Riney	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope-----	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
RxE*: Rock outcrop.					
Caneyville-----	Severe: slope, depth to rock.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
SnB----- Sonora	Moderate: seepage.	Moderate: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
SnC----- Sonora	Moderate: seepage.	Moderate: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
TsB----- Tilsit	Moderate: depth to rock, seepage.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
TsC----- Tilsit	Moderate: depth to rock, seepage.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
VrB2----- Vertrees	Slight-----	Severe: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
VrC2, VrD2----- Vertrees	Slight-----	Severe: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
VrE----- Vertrees	Severe: slope.	Severe: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
VtC3----- Vertrees	Slight-----	Severe: hard to pack.	Deep to water----	Slope-----	Slope.
WeB----- Wellston	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
WeC, WeD----- Wellston	Severe: slope.	Severe: piping.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AlA, AlB, AlC--- Allegheny	0-10	Loam-----	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	10-48	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	48-62	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
BaB----- Baxter	0-7	Gravelly silt loam.	ML, GM, CL-ML, GM-GC	A-4	0-10	60-90	55-80	45-70	45-70	25-35	4-10
	7-13	Gravelly silty clay loam, gravelly silt loam.	CL, SM-SC, GC, CL-ML	A-4, A-6	0-10	60-90	55-80	55-80	45-80	25-40	5-20
	13-28	Gravelly silty clay, gravelly clay.	CH, CL, GC	A-7	0-10	55-90	45-85	45-85	45-80	40-60	20-35
	28-73	Gravelly clay, gravelly silty clay.	GC, CH, CL	A-7	0-20	50-90	45-85	45-85	45-80	45-70	20-40
BaC2, BaD2, BaE-- Baxter	0-4	Gravelly silt loam.	ML, GM, CL-ML, GM-GC	A-4	0-10	60-90	55-80	45-70	45-70	25-35	4-10
	4-10	Gravelly silty clay loam, gravelly silt loam.	CL, SM-SC, GC, CL-ML	A-4, A-6	0-10	60-90	55-80	55-80	45-80	25-40	5-20
	10-25	Gravelly silty clay, gravelly clay.	CH, CL, GC, SC	A-7	0-10	55-90	45-85	45-85	45-80	40-60	20-35
	25-70	Gravelly clay, gravelly silty clay.	GC, CH, MH, CL	A-7	0-20	50-90	45-85	45-85	45-80	45-70	20-40
BmE*: Bledsoe-----	0-5	Fine sandy loam	CL, CL-ML	A-4, A-6	0-5	85-95	80-95	70-90	50-90	20-35	5-15
	5-22	Sandy clay loam, loam, clay loam.	CL	A-7, A-6	0-5	85-95	80-95	65-90	50-90	25-40	10-30
	22-62	Gravelly silty clay loam, silty clay, clay.	CH, CL	A-7, A-6	0-10	80-100	70-100	65-90	50-90	35-60	15-40
Wallen-----	0-6	Gravelly loam----	ML, SM, CL-ML, SM-SC	A-2, A-4	0-10	70-100	60-100	40-70	30-55	<35	NP-10
	6-30	Very cobbly loam, very cobbly silt loam, very channery fine sandy loam.	GM, GM-GC, SM-SC, SM	A-2, A-4	15-35	70-85	70-85	45-60	15-40	<35	NP-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CaD, CaE----- Caneyville	0-9	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	9-14	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	14-24	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeD3----- Caneyville	0-3	Silty clay loam	CL	A-7, A-6	0-3	90-100	85-100	75-100	65-100	35-50	20-35
	3-14	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	14-24	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CnB, CnC2, CnD2, CnE----- Canmer	0-6	Silt loam-----	ML, CL-ML, CL	A-4	0-5	85-100	80-100	70-95	43-70	18-30	2-9
	6-14	Loam, silt loam, clay loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	80-100	75-95	45-75	30-41	9-17
	14-24	Silty clay loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	80-100	75-95	45-75	30-41	9-17
	24-75	Sandy clay, clay, clay loam.	MH, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-95	35-68	9-32
CoD3----- Canmer	0-5	Clay loam-----	CL, SC	A-4, A-6, A-7	0-5	90-100	80-100	75-95	45-75	30-41	9-17
	5-60	Clay, sandy clay, clay loam.	MH, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-95	35-68	9-32
CrB2, CrC2----- Crider	0-9	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	3-12
	9-30	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	3-20
	30-62	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	90-100	85-100	70-100	60-100	35-65	15-40
ElB----- Elk	0-11	Silt loam-----	ML, CL, CL-ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	11-50	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	50-60	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FaB2, FaC2, FaD2, FaE----- Frederick	0-8	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	75-95	75-90	<35	NP-15
	8-37	Silty clay loam, silty clay, clay.	CH, MH, CL	A-7	0-5	80-100	75-100	70-95	60-90	40-70	20-40
	37-75	Clay, silty clay	CH, CL	A-7	0-5	80-100	75-100	70-100	60-95	40-80	15-50
FcC3, FcD3----- Frederick	0-5	Silty clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	85-100	70-95	50-95	20-45	5-25
	5-22	Silty clay loam, silty clay, clay.	CH, MH, CL	A-7	0-5	80-100	75-100	70-95	60-90	40-70	20-40
	22-61	Clay, silty clay	CH, CL	A-7	0-5	80-100	75-100	70-100	60-95	40-80	15-50

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FdC*:											
Fredonia-----	0-8	Silt loam-----	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	8-33	Silty clay, clay	CH, MH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown-----	0-8	Silt loam-----	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	8-15	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	15-56	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vertrees-----	0-6	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	6-20	Clay, silty clay	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
	20-79	Clay, cherty clay	CH	A-7	0-10	75-100	75-100	70-90	65-80	50-70	25-45
FdC3*:											
Fredonia-----	0-9	Silty clay loam	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	9-33	Silty clay, clay	CH, MH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown-----	0-8	Silt loam-----	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	8-15	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	15-56	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vertrees-----	0-6	Silty clay loam	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	6-20	Clay, silty clay	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
	20-79	Clay, cherty clay	CH	A-7	0-10	75-100	75-100	70-90	65-80	50-70	25-45
GaB-----	0-9	Silt loam-----	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	70-90	25-35	4-10
Gatton	9-28	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	90-100	70-90	20-45	4-22
	28-62	Fine sandy loam, loam, sandy clay loam.	ML, SM, SC, CL	A-4	0	95-100	90-100	75-95	40-70	<30	NP-10
Gr-----	0-13	Fine sandy loam	SM, ML, SM-SC	A-2, A-4	0-5	80-100	75-100	50-100	25-75	<20	NP-5
Grigsby	13-61	Loam, fine sandy loam, silt loam.	ML, SM, SC, CL	A-2, A-4, A-6	0-5	80-100	75-100	70-100	30-75	<30	NP-12
	61-72	Fine sandy loam, loam, gravelly sandy loam.	SM, SM-SC, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct						
HdB*: Hagerstown-----	0-8	Silt loam-----	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	80-100	80-100	70-95	25-50	5-25
	8-15	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	15-56	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fredonia-----	0-8	Silt loam-----	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	8-33	Silty clay, clay	CH, MH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vertrees-----	0-6	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	6-20	Clay, silty clay	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
	20-79	Clay, cherty clay	CH	A-7	0-10	75-100	75-100	70-90	65-80	50-70	25-45
JfD*, JfE*: Jefferson-----	0-5	Fine sandy loam	SM, SC, ML, CL	A-2, A-4	0-5	85-95	75-95	60-80	25-65	20-35	2-10
	5-62	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-5	75-90	50-95	50-80	30-70	15-35	2-15
Lily-----	0-9	Loam-----	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	9-24	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	24-39	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-10	65-100	50-100	40-95	20-75	<35	3-15
	39-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
La----- Lawrence	0-8	Silt loam-----	ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	8-28	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	28-42	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	42-62	Silty clay, silty clay loam, silt loam.	ML, CL, MH, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-60	5-25
LdC, LdD, LdE---- Lenberg	0-4	Silt loam-----	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	70-100	75-95	65-90	20-45	2-22
	4-37	Silty clay loam, silty clay, gravelly clay.	CL, CH	A-6, A-7	0-5	75-100	70-100	65-95	50-90	35-70	15-40
	37-40	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct						
LlB----- Lily	0-9	Loam-----	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-80	<35	NP-10
	9-24	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	24-39	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-10	65-100	50-100	40-95	20-75	<35	3-15
	39-52	Weathered bedrock.	---	---	---	---	---	---	---	---	---
LlC, LlD----- Lily	0-9	Loam-----	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-80	<35	NP-10
	9-24	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	24-39	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1-b	0-10	65-100	50-100	40-95	20-75	<35	3-15
	39-52	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Ln----- Lindside	0-9	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	9-62	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	75-100	75-100	70-95	25-40	4-18
Me----- Melvin	0-9	Silt loam-----	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-32	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
	32-86	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	25-40	5-20
Nb----- Newark	0-10	Silt loam-----	ML, CL, CL-ML	A-4	0	95-100	95-100	80-100	55-95	<32	NP-10
	10-42	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	85-100	70-100	22-42	3-20
	42-62	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NcB----- Nicholson	0-10	Silt loam-----	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	10-28	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	28-46	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-100	25-45	5-20
	46-62	Silty clay, clay, channery clay.	CH, CL	A-6, A-7	0	95-100	80-100	70-100	60-100	34-70	16-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NhB2, NhC2, NhD2- Nolichucky	0-11	Loam-----	SM-SC, SC,	A-4, A-2	0-5	80-100	75-100	50-95	30-85	18-25	3-10
			CL, CL-ML								
	11-15	Clay loam, gravelly clay loam, loam.	SC, GC, CL	A-4, A-2, A-6	0-5	80-100	75-100	50-90	30-75	25-35	8-15
	15-48	Clay loam, gravelly clay loam, sandy clay loam.	CL, SC, GC	A-6, A-7, A-2	0-5	80-100	75-100	50-95	25-85	35-45	15-22
	48-65	Clay loam, clay, gravelly clay loam.	CL, CH, SC, GC	A-6, A-7, A-2	0-20	60-100	55-100	45-95	25-90	38-55	17-30
No, Np----- Nolin	0-10	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	10-62	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
OtA----- Otwell	0-11	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	11-32	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	32-70	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	15-30
	70-75	Stratified loam to silty clay.	CL	A-6, A-7	0	95-100	75-100	75-100	65-95	35-50	15-30
Pt*. Pits											
RnB----- Riney	0-4	Loam-----	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	10-30	NP-10
	4-43	Clay loam, sandy clay loam.	ML, CL, SC, SM-SC	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-42	2-15
	43-75	Sandy loam, sandy clay loam, loamy sand.	SC, ML, CL, SC-SM	A-4, A-6, A-2	0	60-100	45-100	40-80	15-55	0-35	NP-15
RnC2, RnD2, RnE-- Riney	0-4	Loam-----	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	10-30	NP-10
	4-43	Clay loam, sandy clay loam.	ML, CL, SC, SM-SC	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-42	2-15
	43-75	Sandy loam, sandy clay loam, loamy sand.	SC, ML, CL, SC-SM	A-4, A-6, A-2	0	60-100	45-100	40-80	15-55	0-35	NP-15
RrC2----- Riney	0-4	Loam-----	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	10-30	NP-10
	4-20	Clay loam, sandy clay loam.	ML, CL, SC, SM-SC	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-42	2-15
	20-55	Sandy loam, sandy clay loam, loamy sand.	SC, ML, CL, SC-SM	A-4, A-6, A-2	0	60-100	45-100	40-80	15-55	0-35	NP-15
	55-59	Weathered bedrock	---	---	---	---	---	---	---	---	---
RrD2----- Riney	0-4	Loam-----	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	10-30	NP-10
	4-20	Clay loam, sandy clay loam.	ML, CL, SC, SM-SC	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-42	2-15
	20-55	Sandy loam, sandy clay loam, loamy sand.	SC, ML, CL, SC-SM	A-4, A-6, A-2	0	60-100	45-100	40-80	15-55	0-35	NP-15
	55-59	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RxE*: Rock outcrop.											
Caneyville-----	0-9	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	9-14	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	14-24	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SnB, SnC----- Sonora	0-7	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	80-90	25-35	4-10
	7-25	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	100	85-100	70-95	20-45	4-25
	25-51	Loam, sandy clay loam, fine sandy loam.	CL, ML, SC, SM	A-4, A-6	0	90-100	90-100	70-90	40-55	10-30	NP-15
	51-72	Sandy clay, sandy clay loam, clay.	CL, SC, CH, CL-ML	A-4, A-6, A-7	0	90-100	90-100	75-95	40-80	25-60	5-40
TsB, TsC----- Tilsit	0-6	Silt loam-----	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-100	20-35	4-15
	6-23	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-100	25-40	5-20
	23-43	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	65-100	25-45	5-25
	43-60	Silt loam, silty clay loam, silty clay.	CL, CH, CL-ML	A-4, A-6, A-7	0-30	70-100	65-85	60-85	55-80	25-60	5-35
VrB2, VrC2, VrD2, VrE----- Vertrees	0-6	Silt loam-----	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	6-20	Clay, silty clay	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
	20-79	Clay, gravelly clay.	CH	A-7	0-10	75-100	75-100	70-90	65-80	50-70	25-45
VtC3----- Vertrees	0-3	Silty clay loam	CL	A-6	0	85-100	80-100	70-95	65-95	30-40	12-20
	3-20	Clay, silty clay	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
	20-63	Clay, gravelly clay.	CH	A-7	0-10	75-100	75-100	70-90	65-80	50-70	25-45
WeB, WeC, WeD---- Wellston	0-10	Silt loam-----	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	10-26	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	80-100	75-100	65-95	60-90	25-40	5-20
	26-45	Silt loam, loam, channery loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	45-62	Very channery loam, gravelly sandy loam, channery clay loam.	SM-SC, SC, GM-GC, CL	A-2, A-4, A-6	0-15	60-80	60-85	50-70	15-55	20-35	5-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AlA, AlB, AlC----- Allegheny	0-10 10-48 48-62	15-27 18-35 10-35	1.20-1.40 1.20-1.50 1.20-1.40	0.6-2.0 0.6-2.0 0.6-2.0	0.12-0.22 0.13-0.18 0.08-0.17	3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low-----	0.32 0.28 0.28	4	1-4
BaB----- Baxter	0-7 7-13 13-28 28-73	12-27 18-40 40-60 40-60	1.20-1.40 1.30-1.55 1.30-1.55 1.35-1.65	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.18 0.14-0.18 0.10-0.14 0.10-0.14	4.5-6.5 4.5-6.5 4.5-5.5 4.5-5.5	Low----- Moderate----- Moderate----- Moderate-----	0.28 0.24 0.24 0.24	5	2-4
BaC2, BaD2, BaE-- Baxter	0-4 4-10 10-25 25-70	12-27 18-40 40-60 40-60	1.20-1.40 1.30-1.55 1.30-1.55 1.35-1.65	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.18 0.14-0.18 0.10-0.14 0.10-0.14	4.5-6.5 4.5-6.5 4.5-5.5 4.5-5.5	Low----- Moderate----- Moderate----- Moderate-----	0.28 0.24 0.24 0.24	5	2-4
BmE*: Bledsoe-----	0-5 5-22 22-62	10-20 35-40 35-60	1.20-1.50 1.30-1.60 1.35-1.60	0.6-2.0 0.2-0.6 0.2-0.6	0.16-0.21 0.16-0.19 0.12-0.19	5.6-7.8 5.6-7.8 5.6-7.8	Low----- Moderate----- Moderate-----	0.37 0.32 0.32	5	4-6
Wallen-----	0-6 6-30 30	8-20 8-20 ---	1.40-1.55 1.40-1.55 ---	2.0-6.0 2.0-6.0 ---	0.07-0.12 0.05-0.09 ---	4.5-6.0 4.5-6.0 ---	Low----- Low----- ---	0.17 0.17 ---	2	0-2
Rock outcrop.										
CaD, CaE----- Caneyville	0-9 9-14 14-24 24	10-27 36-60 40-60 ---	1.20-1.40 1.35-1.60 1.35-1.60 ---	0.6-2.0 0.2-0.6 0.2-0.6 ---	0.15-0.22 0.12-0.18 0.12-0.18 ---	4.5-7.3 4.5-7.3 5.6-7.8 ---	Low----- Moderate----- Moderate----- ---	0.43 0.28 0.28 ---	3	2-4
CeD3----- Caneyville	0-3 3-14 14-24 24	27-40 36-60 40-60 ---	1.25-1.50 1.35-1.60 1.35-1.60 ---	0.2-0.6 0.2-0.6 0.2-0.6 ---	0.17-0.20 0.12-0.18 0.12-0.18 ---	4.5-7.3 4.5-7.3 5.6-7.8 ---	Moderate----- Moderate----- Moderate----- ---	0.37 0.28 0.28 ---	2	<2
CnB, CnC2, CnD2, CnE----- Canmer	0-6 6-14 14-24 24-75	10-30 20-32 35-50 35-70	1.35-1.55 1.40-1.55 1.40-1.55 1.40-1.55	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.15-0.20 0.12-0.16 0.12-0.16 0.10-0.15	4.5-7.3 4.5-7.3 4.5-5.5 4.5-5.5	Low----- Moderate----- Moderate----- Moderate-----	0.37 0.28 0.28 0.28	5	1-4
CoD3----- Canmer	0-5 5-60	27-40 35-70	1.35-1.55 1.40-1.55	0.6-2.0 0.6-2.0	0.12-0.16 0.10-0.15	4.5-7.3 4.5-5.5	Moderate----- Moderate-----	0.28 0.28	4	<2
CrB2, CrC2----- Crider	0-9 9-30 30-62	15-27 18-35 30-60	1.20-1.40 1.20-1.45 1.20-1.55	0.6-2.0 0.6-2.0 0.6-2.0	0.19-0.23 0.18-0.23 0.12-0.18	5.1-7.3 5.1-7.3 4.5-6.5	Low----- Low----- Moderate-----	0.32 0.28 0.28	5	2-4
ElB----- Elk	0-11 11-50 50-60	10-27 18-34 15-40	1.20-1.40 1.20-1.50 1.20-1.50	0.6-2.0 0.6-2.0 0.6-2.0	0.19-0.23 0.18-0.22 0.14-0.20	4.5-6.5 4.5-6.5 5.1-6.5	Low----- Low----- Low-----	0.37 0.28 0.28	5	.5-3

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
FaB2, FaC2, FaD2, FaE----- Frederick	0-8 8-37 37-75	13-27 35-75 40-80	1.25-1.50 1.20-1.50 1.20-1.50	2.0-6.0 0.6-2.0 0.6-2.0	0.16-0.24 0.12-0.18 0.10-0.18	4.5-6.0 4.5-6.0 4.5-6.0	Low----- Moderate---- Moderate----	0.32 0.24 0.24	5	2-4
FcC3, FcD3----- Frederick	0-5 5-22 22-61	27-40 35-75 40-80	1.30-1.60 1.20-1.50 1.20-1.50	0.6-2.0 0.6-2.0 0.6-2.0	0.12-0.20 0.12-0.18 0.10-0.18	4.5-6.0 4.5-6.0 4.5-6.0	Moderate---- Moderate---- Moderate----	0.32 0.24 0.24	4	.5-2
FdC*: Fredonia-----	0-8 8-33 33	18-27 40-60 ---	1.30-1.50 1.30-1.60 ---	0.6-2.0 0.06-0.6 ---	0.18-0.22 0.13-0.18 ---	5.1-6.5 5.1-7.3 ---	Low----- Moderate---- -----	0.37 0.28 ---	3	2-4
Hagerstown-----	0-8 8-15 15-56 56	22-27 35-40 40-60 ---	1.25-1.40 1.30-1.50 1.35-1.60 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.22-0.24 0.15-0.22 0.10-0.20 ---	5.1-6.5 5.1-6.5 5.1-7.3 ---	Low----- Moderate---- Moderate---- -----	0.32 0.28 0.28 ---	4	2-4
Vertrees-----	0-6 6-20 20-79	15-27 35-60 40-60	1.20-1.40 1.40-1.65 1.45-1.65	0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.22 0.14-0.18 0.10-0.16	4.5-7.3 4.5-6.0 4.5-7.3	Low----- Moderate---- Moderate----	0.37 0.28 0.28	5	2-4
FdC3*: Fredonia-----	0-9 9-33 33	27-40 40-60 ---	1.30-1.50 1.30-1.60 ---	0.6-2.0 0.06-0.6 ---	0.18-0.22 0.13-0.18 ---	5.1-6.5 5.1-7.3 ---	Low----- Moderate---- -----	0.37 0.28 ---	3	<2
Hagerstown-----	0-8 8-15 15-56 56	22-27 35-40 40-60 ---	1.25-1.40 1.30-1.50 1.35-1.60 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.22-0.24 0.15-0.22 0.10-0.20 ---	5.1-6.5 5.1-6.5 5.1-7.3 ---	Low----- Moderate---- Moderate---- -----	0.32 0.28 0.28 ---	4	<2
Vertrees-----	0-6 6-20 20-79	27-40 35-60 40-60	1.20-1.40 1.40-1.65 1.45-1.65	0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.22 0.14-0.18 0.10-0.16	4.5-7.3 4.5-6.0 4.5-7.3	Low----- Moderate---- Moderate----	0.37 0.28 0.28	4	<2
GaB----- Gatton	0-9 9-28 28-62	15-27 18-35 15-40	1.20-1.40 1.25-1.40 1.50-1.70	0.6-2.0 0.6-2.0 0.06-0.2	0.19-0.23 0.18-0.23 0.06-0.9	4.5-7.3 4.5-6.0 4.5-5.5	Low----- Low----- Low-----	0.37 0.43 0.37	3	2-4
Gr----- Grigsby	0-13 13-61 61-72	5-10 5-18 5-18	1.20-1.50 1.20-1.50 1.20-1.50	2.0-6.0 2.0-6.0 2.0-6.0	0.12-0.16 0.14-0.20 0.03-0.16	5.6-7.3 5.6-7.3 4.5-7.3	Low----- Low----- Low-----	0.28 0.28 0.28	5	1-4
HdB*: Hagerstown-----	0-8 8-15 15-56 56	15-27 35-40 40-60 ---	1.20-1.40 1.20-1.60 1.20-1.60 ---	0.6-6.0 0.6-2.0 0.6-2.0 ---	0.16-0.24 0.10-0.24 0.10-0.24 ---	5.1-6.5 5.1-7.3 5.1-7.3 ---	Low----- Moderate---- Moderate---- -----	0.32 0.28 0.28 ---	4	2-4
Fredonia-----	0-8 8-33 33	18-40 40-60 ---	1.30-1.50 1.30-1.60 ---	0.6-2.0 0.06-0.6 ---	0.18-0.22 0.13-0.18 ---	5.1-6.5 5.1-7.3 ---	Low----- Moderate---- -----	0.37 0.28 ---	3	2-4
Vertrees-----	0-6 6-20 20-79	15-27 35-60 40-60	1.20-1.40 1.40-1.65 1.45-1.65	0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.22 0.14-0.18 0.10-0.16	4.5-7.3 4.5-6.0 4.5-7.3	Low----- Moderate---- Moderate----	0.37 0.28 0.28	5	2-4

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction pH	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
JfD*, JfE*: Jefferson-----	0-5 5-62	10-20 18-34	1.30-1.50 1.30-1.65	2.0-6.0 2.0-6.0	0.10-0.18 0.10-0.16	4.5-5.5 4.5-5.5	Low----- Low-----	0.24 0.28	5	.5-5
Lily-----	0-9 9-24 24-39 39-52	7-20 18-35 18-35 ---	1.20-1.40 1.25-1.35 1.25-1.35 ---	2.0-6.0 2.0-6.0 2.0-6.0 ---	0.10-0.16 0.12-0.18 0.08-0.17 ---	3.6-6.0 3.6-6.0 3.6-6.0 ---	Low----- Low----- Low----- ---	0.28 0.28 0.17 ---	2	.5-2
Rock outcrop.										
La----- Lawrence	0-8 8-28 28-42 42-62	12-27 18-35 18-35 18-60	1.20-1.40 1.40-1.60 1.50-1.70 1.50-1.70	0.6-2.0 0.6-2.0 0.06-0.2 0.06-0.6	0.19-0.23 0.18-0.22 0.08-0.12 0.08-0.12	4.5-6.5 4.5-6.5 4.5-5.5 4.5-7.3	Low----- Low----- Low----- Low-----	0.43 0.37 0.43 0.37	3	2-4
LdC, LdD, LdE--- Lenberg	0-4 4-37 37-40	12-27 35-60 ---	1.30-1.50 1.40-1.60 ---	0.6-2.0 0.2-0.6 ---	0.18-0.23 0.10-0.19 ---	4.5-7.3 4.5-5.5 ---	Low----- Moderate---- ---	0.43 0.37 ---	3	.5-2
LlB----- Lily	0-9 9-24 24-39 39-52	7-27 18-35 18-35 ---	1.20-1.40 1.25-1.35 1.25-1.35 ---	0.6-6.0 2.0-6.0 2.0-6.0 ---	0.13-0.18 0.12-0.18 0.08-0.17 ---	3.6-6.0 3.6-6.0 3.6-6.0 ---	Low----- Low----- Low----- ---	0.28 0.28 0.17 ---	2	.5-2
LlC, LlD----- Lily	0-9 9-24 24-39 39-52	7-27 18-35 18-35 ---	1.20-1.40 1.25-1.35 1.25-1.35 ---	0.6-6.0 2.0-6.0 2.0-6.0 ---	0.13-0.18 0.12-0.18 0.08-0.17 ---	3.6-6.0 3.6-6.0 3.6-6.0 ---	Low----- Low----- Low----- ---	0.28 0.28 0.17 ---	2	.5-2
Ln----- Lindside	0-9 9-62	15-27 18-35	1.20-1.40 1.20-1.40	0.6-2.0 0.6-2.0	0.20-0.26 0.17-0.22	5.1-7.8 5.1-7.8	Low----- Low-----	0.32 0.37	5	2-4
Me----- Melvin	0-9 9-32 32-86	12-27 12-35 7-35	1.20-1.60 1.30-1.60 1.40-1.70	0.6-2.0 0.6-2.0 0.6-2.0	0.18-0.23 0.18-0.23 0.16-0.23	5.6-7.8 5.6-7.8 5.6-7.8	Low----- Low----- Low-----	0.43 0.43 0.43	5	2-4
Nb----- Newark	0-10 10-42 42-62	7-27 18-35 12-40	1.20-1.40 1.20-1.45 1.30-1.50	0.6-2.0 0.6-2.0 0.6-2.0	0.15-0.23 0.18-0.23 0.15-0.22	5.6-7.8 5.6-7.8 5.6-7.8	Low----- Low----- Low-----	0.43 0.43 0.43	5	2-4
NcB----- Nicholson	0-10 10-28 28-46 46-62	12-27 18-35 18-35 35-60	1.20-1.40 1.40-1.60 1.50-1.70 1.40-1.60	0.6-2.0 0.6-2.0 0.06-0.2 0.06-0.6	0.19-0.23 0.18-0.22 0.07-0.12 0.07-0.12	4.5-6.5 4.5-6.5 4.5-6.5 5.1-7.8	Low----- Low----- Low----- Moderate----	0.43 0.43 0.43 0.28	3	2-4
NhB2, NhC2, NhD2- Nolichucky	0-11 11-15 15-48 48-65	10-27 18-30 18-35 30-50	1.30-1.45 1.30-1.45 1.40-1.55 1.40-1.55	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.18-0.22 0.08-0.17 0.09-0.17 0.07-0.15	4.5-6.5 4.5-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low----- Moderate----	0.28 0.20 0.20 0.20	5	.5-2
No, Np----- Nolin	0-10 10-62	12-27 18-35	1.20-1.40 1.25-1.50	0.6-2.0 0.6-2.0	0.18-0.23 0.18-0.23	5.6-7.8 5.6-7.8	Low----- Low-----	0.43 0.43	5	2-4
OtA----- Otwell	0-11 11-32 32-70 70-75	18-27 22-30 18-30 18-30	1.25-1.40 1.30-1.50 1.60-1.80 1.50-1.65	0.6-2.0 0.2-0.6 <0.06 0.06-0.2	0.22-0.24 0.18-0.22 0.06-0.08 0.06-0.08	4.5-7.3 4.5-5.5 4.5-5.5 5.1-8.4	Low----- Low----- Low----- Low-----	0.43 0.43 0.43 0.43	3	2-4

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Pt*. Pits										
RnB----- Riney	0-4 4-43 43-75	10-25 18-35 10-35	1.20-1.40 1.20-1.50 1.20-1.50	2.0-6.0 2.0-6.0 2.0-6.0	0.12-0.18 0.13-0.17 0.05-0.14	4.5-7.3 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.28 0.28 0.28	5	2-3
RnC2, RnD2, RnE-- Riney	0-4 4-43 43-75	10-25 18-35 10-35	1.20-1.40 1.20-1.50 1.20-1.50	2.0-6.0 2.0-6.0 2.0-6.0	0.12-0.18 0.13-0.17 0.05-0.14	4.5-7.3 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.28 0.28 0.28	5	2-3
RrC2----- Riney	0-4 4-20 20-55 55-59	10-25 18-35 10-35 ---	1.20-1.40 1.20-1.50 1.20-1.50 ---	2.0-6.0 2.0-6.0 2.0-6.0 ---	0.12-0.18 0.13-0.17 0.05-0.14 ---	4.5-7.3 4.5-5.5 4.5-5.5 ---	Low----- Low----- Low----- -----	0.28 0.28 0.28 ---	4	2-3
RrD2----- Riney	0-4 4-20 20-55 55-59	10-25 18-35 10-35 ---	1.20-1.40 1.20-1.50 1.20-1.50 ---	2.0-6.0 2.0-6.0 2.0-6.0 ---	0.12-0.18 0.13-0.17 0.05-0.14 ---	4.5-7.3 4.5-5.5 4.5-5.5 ---	Low----- Low----- Low----- -----	0.28 0.28 0.28 ---	4	2-3
RxE*: Rock outcrop.										
Caneyville-----	0-9 9-14 14-24 24	10-27 36-60 40-60 ---	1.20-1.40 1.35-1.60 1.35-1.60 ---	0.6-2.0 0.2-0.6 0.2-0.6 ---	0.15-0.22 0.12-0.18 0.12-0.18 ---	4.5-7.3 4.5-7.3 5.6-7.8 ---	Low----- Moderate----- Moderate----- -----	0.43 0.28 0.28 ---	3	2-4
SnB, SnC----- Sonora	0-7 7-25 25-51 51-72	15-27 18-35 18-35 30-50	1.20-1.40 1.20-1.45 1.20-1.45 1.20-1.55	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.19-0.23 0.18-0.22 0.12-0.18 0.13-0.18	4.5-7.3 4.5-6.5 4.5-5.5 4.5-5.5	Low----- Low----- Low----- Moderate-----	0.43 0.37 0.32 0.28	5	2-4
TsB, TsC----- Tilsit	0-6 6-23 23-43 43-60	10-27 18-35 18-35 10-50	1.20-1.55 1.30-1.55 1.40-1.65 1.40-1.60	0.6-2.0 0.6-2.0 0.06-0.2 0.06-0.6	0.16-0.22 0.16-0.22 0.08-0.12 0.08-0.22	3.6-5.5 3.6-5.5 3.6-5.5 3.6-5.5	Low----- Low----- Low----- Low-----	0.43 0.43 0.43 0.43	3	1-3
VrB2, VrC2, VrD2, VrE----- Vertrees	0-6 6-20 20-79	15-27 35-60 40-60	1.20-1.40 1.40-1.65 1.45-1.65	0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.22 0.14-0.18 0.10-0.16	4.5-7.3 4.5-6.0 4.5-7.3	Low----- Moderate----- Moderate-----	0.37 0.28 0.28	5	2-4
VtC3----- Vertrees	0-3 3-20 20-63	27-40 35-60 40-60	1.20-1.40 1.40-1.65 1.45-1.65	0.6-2.0 0.2-0.6 0.2-0.6	0.14-0.22 0.14-0.18 0.10-0.16	4.5-7.3 4.5-6.0 4.5-7.3	Low----- Moderate----- Moderate-----	0.32 0.28 0.28	4	<2
WeB, WeC, WeD---- Wellston	0-10 10-26 26-45 45-62	13-27 18-35 18-30 18-30	1.30-1.50 1.30-1.65 1.30-1.60 1.30-1.60	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.18-0.22 0.17-0.21 0.12-0.17 0.06-0.16	5.1-6.5 4.5-6.0 4.5-6.0 4.5-6.0	Low----- Low----- Low----- Low-----	0.37 0.37 0.37 0.20	4	2-4

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hard-ness	Uncoated steel	Concrete
AlA, AlB, AlC----- Allegheny	B	Rare-----	---	---	>6.0	---	---	>60	---	Low-----	High.
BaB, BaC2, BaD2, BaE----- Baxter	B	None-----	---	---	>6.0	---	---	>60	---	High-----	High.
BmE*: Bledsoe-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Wallen----- Rock outcrop.	B	None-----	---	---	>6.0	---	---	20-40	Hard	Low-----	High.
CaD, CaE, CeD3----- Caneyville	C	None-----	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
CnB, CnC2, CnD2, CnE, CoD3----- Canmer	B	None-----	---	---	>6.0	---	---	>60	---	High-----	High.
CrB2, CrC2----- Crider	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ElB----- Elk	B	Rare-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FaB2, FaC2, FaD2, FaE, FcC3, FcD3-- Frederick	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High.
FdC*, FdC3*: Fredonia-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Hagerstown-----	C	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Low.
Vertrees-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
GaB----- Gatton	B	None-----	---	---	1.5-2.0	Perched	Jan-Apr	>60	---	Moderate	Moderate.
Gr----- Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low-----	Low.
HdB*: Hagerstown-----	C	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Low.
Fredonia-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Vertrees-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
JfD*, JfE*: Jefferson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High.
Lily-----	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hard-ness	Uncoated steel	Concrete
JfD*, JfE*: Rock outcrop.											
La----- Lawrence	C	Occasional	Brief-----	Dec-Apr	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High.
LdC, LdD, LdE----- Lenberg	C	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
LlB, LlC, LlD----- Lily	B	None-----	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
Ln----- Lindside	C	Occasional	Very brief to brief.	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
Me----- Melvin	D	Frequent-----	Brief-----	Nov-May	+2-0.5	Apparent	Jan-Dec	>60	---	High-----	Low.
Nb----- Newark	C	Occasional	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
NcB----- Nicholson	C	None-----	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High-----	Moderate.
NhB2, NhC2, NhD2-- Nolichucky	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High.
No----- Nolin	B	Occasional	Brief-----	Feb-Apr	3.0-6.0	Apparent	Feb-Mar	>60	---	Low-----	Moderate.
Np----- Nolin	B	Frequent-----	Brief-----	Feb-Apr	3.0-6.0	Apparent	Feb-Mar	>60	---	Low-----	Moderate.
OtA----- Otwell	C	Rare-----	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	Moderate	High.
RnB, RnC2, RnD2, RnE----- Riney	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High.
RrC2, RrD2----- Riney	B	None-----	---	---	>6.0	---	---	>48	Soft	Moderate	High.
RxE*: Rock outcrop.											
Caneyville-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
SnB, SnC----- Sonora	B	None-----	---	---	>6.0	---	---	>60	---	High-----	High.
TsB, TsC----- Tilsit	C	None-----	---	---	1.5-2.5	Perched	Jan-Apr	>40	Hard	High-----	High.
VrB2, VrC2, VrD2, VrE, VtC3----- Vertrees	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
WeB, WeC, WeD----- Wellston	B	None-----	---	---	>6.0	---	---	40-72	Hard	Moderate	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS

(A dash indicates that the material was not detected. A blank indicates that the determination was not made. The pedons are typical of the soil series in the survey area. For the location of the pedons, see "Soil Series and Their Morphology." Analysis by the Kentucky Agricultural Experiment Station)

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)							Very fine sand plus silt (0.1- 0.002)	Tex- tural class	Coarse fragments			
	Sand (2- 0.05 mm)	Silt (0.05- 0.002 mm)	Clay (<0.002 mm)	Sand					Sand coarser than very fine (2-0.1)							
				Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5- 0.25)	Fine (0.25- 0.1)	Very fine (0.1- 0.05)								
-----Pct <2mm-----														Pct	Pct	Pct
Baxter gravelly silt loam: 83KY-099-1-(1-7)																
Ap----	0 to 4	10.0	67.4	22.6	2.5	1.6	1.3	2.4	2.2	7.8	69.0	sil	---	---	---	
Bt1---	4 to 10	13.5	54.9	31.6	4.1	1.6	1.5	3.2	3.1	10.4	58.0	sic1	20	6	14	
Bt2---	10 to 25	6.4	40.1	53.5	0.7	0.5	1.0	2.1	2.1	4.3	42.2	sic	13	5	8	
Bt3---	25 to 37	5.6	33.5	60.9	0.7	0.5	0.9	1.8	1.7	3.9	35.2	c	22	3	19	
Bt4---	37 to 49	4.5	24.3	71.2	0.4	0.4	0.9	1.5	1.3	3.2	25.6	c	25	2	23	
Bt4---	49 to 60	4.2	30.6	65.2	0.7	0.5	0.6	1.1	1.3	2.9	31.9	c	49	2	47	
Bt5---	60 to 70	2.9	18.9	78.2	0.5	0.4	0.3	0.7	1.0	1.9	19.9	c	22	4	18	
Frederick silt loam: 83KY-099-3-(1-5)																
Ap----	0 to 8	31.1	50.7	18.2	1.4	2.0	6.4	16.1	5.2	25.9	55.9	sil	12	1	11	
Bt1---	8 to 20	32.0	24.9	43.1	0.8	1.2	6.6	17.9	5.5	26.5	30.4	c	10	9	1	
Bt2---	20 to 37	35.5	19.8	44.7	1.0	1.3	6.6	20.5	6.1	29.4	25.9	c	6	4	2	
Bt3---	37 to 50	35.6	22.4	42.0	0.8	1.0	6.5	20.5	6.8	28.8	29.2	c	13	1	12	
Bt4---	50 to 75	33.0	22.0	45.0	0.7	1.2	6.1	18.8	6.2	26.8	28.2	c	7	2	5	
Canmer silt loam: 83KY-099-4-(1-7)																
A-----	0 to 6	26.4	59.4	14.2	2.5	7.1	8.8	5.7	2.3	24.1	61.7	sil	20	10	10	
BA----	6 to 14	23.8	56.1	20.1	2.1	5.2	7.9	5.9	2.7	21.1	58.8	sil	21	4	17	
Bt1---	14 to 24	17.2	47.0	35.8	2.2	2.7	4.4	5.0	2.9	14.3	49.9	sic1	14	9	5	
Bt2---	24 to 36	4.6	26.4	69.0	0.2	0.5	0.9	1.2	1.8	2.8	28.2	c	5	3	2	
Bt3---	36 to 48	6.1	27.9	66.0	0.2	0.5	0.6	1.9	2.9	3.2	30.8	c	2	1	1	
Bt3---	48 to 59	5.2	26.4	68.4	0.3	0.3	0.5	1.6	2.5	2.7	28.9	c	1	1	---	
Bt4---	59 to 75	10.8	28.5	60.7	1.4	1.2	0.6	1.5	6.1	4.7	34.6	c	1	1	---	

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)							Very fine sand plus silt (0.1- 0.002)	Tex- tural class	Coarse fragments		
	Sand (2- 0.05 mm)	Silt (0.05- 0.002 mm)	Clay (0.002 mm)	Sand					Sand coarser than very fine (2-0.1)	>2 mm			2-19 mm	19-76 mm	
				Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5- 0.25)	Fine (0.25- 0.1)	Very fine (0.1- 0.05)							
	-----Pct <2mm-----												Pct	Pct	Pct
Riney loam: 83KY-099-5-(1-5)															
Ap---- 0 to 4	45.5	45.6	8.9	2.2	4.0	9.3	19.9	10.1	35.4	55.7	1	12	11	1	
BE---- 4 to 10	43.4	40.4	16.2	3.6	4.3	9.5	19.0	7.0	36.4	47.4	1	19	16	3	
Bt1---10 to 28	40.7	21.3	38.0	2.0	3.5	9.9	17.7	7.6	33.1	28.9	cl	7	7	---	
Bt2---28 to 43	59.0	6.1	34.9	1.4	5.7	17.9	23.9	10.1	48.9	16.2	scl	5	5	---	
CB----43 to 75	80.1	5.1	14.8	6.5	12.0	22.8	28.9	9.9	70.2	15.0	sl	54	50	4	
Grigsby fine sandy loam: 83KY-099-7-(1-7)															
Ap---- 0 to 9	57.2	34.8	8.0	0.1	1.4	15.6	33.8	6.3	50.9	41.1	fsl	---	---	---	
A----- 9 to 13	59.1	33.8	7.1	0.1	1.2	14.3	35.6	7.9	51.2	41.7	fsl	2	2	---	
Bw1---13 to 23	52.6	35.3	12.1	0.1	0.7	7.6	33.7	10.5	42.1	45.8	fsl	3	3	---	
Bw2---23 to 33	36.8	40.9	22.3	0.2	0.5	4.1	23.4	8.6	28.2	49.5	1	4	4	---	
Bw3---33 to 44	26.9	47.1	26.0	0.4	0.6	2.5	16.1	7.3	19.6	54.4	1	2	2	---	
CB----44 to 61	44.1	37.1	18.8	0.3	0.7	2.4	26.4	14.3	29.8	51.4	1	---	---	---	
C-----61 to 72	63.2	26.9	9.9	0.2	0.4	2.3	37.4	22.9	40.3	49.8	fsl	---	---	---	

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS

(A dash indicates that the material was not detected. TR indicates trace amounts of the element. A blank indicates that the determination was not made. The pedons are typical of the soil series in the survey area. For the location of the pedons, see "Soil Series and Their Morphology." Analysis by the Kentucky Agricultural Experiment Station)

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation-exchange capacity				Base saturation					
	H ₂ O	KCl	Ca	Mg	K	Na	Total	Ammonium	Sum of	Extract-	Hydrogen	Ammonium	Sum of	Organic	Calcium	Phos-	Potas-
	1:1	1:1					(TEC)	acetate	cations	able	plus	acetate	cations	matter	carbonate	phorus	sium
										acidity	aluminum				equivalent		
			-----Milliequivalents per 100 grams of soil-----										Pct	Pct	Pct	Pct	p/m
Baxter gravelly silt loam: 83KY-099-1-(1-7)																	
Ap---- 0 to 4	6.2	5.6	9.0	2.0	0.3	0.1	11.4	11.0	15.6	4.2	0.1	103.6	73.1	3.80	0.6	70	250
Bt1--- 4 to 10	6.1	5.9	8.8	1.5	0.2	0.2	10.7	9.3	16.0	5.3	0.1	115.1	66.9	0.84	0.3	5	185
Bt2---10 to 25	6.4	5.6	10.8	1.3	0.2	0.1	12.4	15.7	19.8	7.4	0.1	79.0	62.6	0.65	0.2	3	160
Bt3---25 to 37	6.1	5.6	10.1	1.8	0.3	0.1	12.3	16.7	21.5	9.2	0.1	73.7	57.2	0.60	0.2	3	153
Bt4---37 to 49	4.7	4.6	10.4	2.6	0.2	0.1	13.3	19.9	25.5	12.2	0.2	66.8	52.2	0.61	---	3	132
Bt4---49 to 60	4.5	4.4	8.7	1.7	0.2	0.1	10.7	17.6	23.8	13.1	0.6	60.8	45.0	0.57	---	4	137
Bt5---60 to 70	5.4	5.5	22.4	1.7	0.3	0.1	24.5	25.2	35.0	10.5	0.1	97.2	70.0	0.79	---	3	205
Frederick silt loam: 83KY-099-3-(1-5)																	
Ap---- 0 to 8	5.3	5.0	4.3	1.4	0.8	0.1	6.6	9.4	14.7	8.1	0.2	70.2	44.9	3.68	---	260	500
Bt1---8 to 20	4.9	3.9	4.8	1.4	0.7	0.1	7.0	11.6	17.1	10.1	0.4	60.3	40.9	0.85	---	20	493
Bt2---20 to 37	4.7	3.7	3.1	1.3	0.4	0.1	4.9	10.6	15.8	10.9	0.5	46.2	31.0	0.45	---	3	332
Bt3---37 to 50	4.5	3.9	2.3	1.4	0.3	0.1	4.1	10.7	14.8	10.7	0.5	38.3	27.7	0.43	---	3	223
Bt4---50 to 75	4.5	3.8	2.0	1.2	0.3	0.1	3.6	11.3	16.5	12.9	0.6	31.9	21.8	0.40	---	5	206
Canmer silt loam: 83KY-099-4-(1-7)																	
A----- 0 to 6	5.3	5.2	4.9	0.6	0.4	0.1	6.0	7.3	12.7	6.7	0.1	82.2	47.2	3.81	---	10	246
BA---- 6 to 14	5.6	5.0	3.3	0.2	0.1	0.1	3.7	5.3	10.9	7.2	0.4	69.8	33.9	1.08	---	4	86
Bt1---14 to 24	4.9	3.8	2.9	0.6	0.2	0.1	3.8	9.9	11.8	8.0	0.6	38.4	32.2	0.56	---	2	177
Bt2---24 to 36	4.6	3.7	2.4	0.7	0.4	0.1	3.6	20.8	23.9	20.3	2.3	17.3	15.1	0.60	---	---	254
Bt3---36 to 48	4.5	3.8	1.1	0.7	0.3	0.1	2.2	21.0	25.8	23.6	2.7	10.5	8.5	0.54	---	---	186
Bt3---48 to 59	4.5	3.9	0.8	0.8	0.3	0.1	2.0	21.5	25.7	23.7	1.0	9.3	7.8	0.50	---	3	182
Bt4---59 to 75	4.5	3.9	0.7	0.8	0.3	0.1	1.9	18.2	22.1	20.2	0.4	10.4	8.6	0.40	---	5	163

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation-exchange capacity					Base saturation					
	H ₂ O	KCl	Ca	Mg	K	Na	Total	Ammonium	Sum of	Extract-	Hydrogen	Ammonium	Sum of	Organic	Calcium	Phos-	Potas-	
	1:1	1:1					(TEC)	acetate	cations	able	plus	acetate	cations	matter	carbonate	phorus	sium	
										acidity	aluminum				equivalent			
			-----Milliequivalents per 100 grams of soil-----										Pct	Pct	Pct	Pct	p/m	p/m
Riney loam: 83KY-099-5-(1-5)																		
Ap---- 0 to 4	4.7	4.2	0.5	0.1	0.2	0.1	0.9	4.4	10.0	9.1	0.6	20.5	9.0	2.40	---	113	187	
BE---- 4 to 10	5.0	4.4	0.9	0.2	0.2	0.1	1.4	4.4	7.3	5.9	0.5	31.8	19.2	0.93	---	10	150	
Bt1---10 to 28	5.0	3.9	2.4	1.5	0.2	0.1	4.2	11.1	14.8	10.6	0.8	37.8	28.4	0.76	---	3	180	
Bt2---28 to 43	4.7	4.0	0.1	0.9	0.2	0.1	1.3	9.5	15.6	14.3	0.6	13.7	8.3	0.37	---	3	140	
CB----43 to 75	4.5	4.3	0.1	0.5	0.1	0.1	0.8	3.2	9.0	8.2	0.6	25.0	8.9	0.25	---	3	55	
Grigsby fine sandy loam: 83KY-099-7-(1-7)																		
Ap---- 0 to 9	6.3	6.0	3.5	0.3	0.1	0.1	4.0	4.2	8.1	4.1	0.1	95.2	49.4	1.75	0.16	30	127	
A----- 9 to 13	6.2	5.5	3.3	0.3	0.1	0.1	3.8	4.0	6.8	3.0	0.1	95.0	55.9	1.25	0.17	30	102	
Bw1---13 to 23	6.4	5.4	2.8	0.5	0.1	0.1	3.5	3.4	7.1	3.6	0.1	102.9	49.3	0.59	0.19	10	66	
Bw2---23 to 33	5.9	5.1	4.7	1.0	0.1	0.1	5.9	7.1	9.5	3.6	0.1	83.1	62.1	0.45	---	7	103	
Bw3---33 to 44	5.6	3.9	4.1	1.4	0.2	0.1	5.8	10.4	16.2	10.4	0.3	55.8	35.8	0.44	---	4	147	
BC----44 to 61	4.5	4.2	0.9	0.6	0.1	0.1	1.7	8.2	12.7	11.0	0.3	20.7	13.4	0.34	---	9	113	
CB----61 to 72	4.6	4.2	0.4	0.6	0.1	0.1	1.2	4.7	8.6	7.4	0.3	25.5	14.0	0.30	---	8	59	

TABLE 19.--CLAY MINERALOGY OF SELECTED SOILS

(A dash indicates that the material was not detected. The pedons are typical of the soil series in the survey area. For the location of the pedons, see "Soil Series and their Morphology." Analysis by the Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebraska)

Soil name, report number, horizon, and depth in inches	Potassium K2O	Iron Pct	Relative amount of clay minerals*									Kaolinite Pct
			Vermiculite	Mica	Kaolinite	Montmorillonite	Vermiculite/ Chlorite	Gibbsite	Chlorite	Vermiculite/ Mica	Quartz	
Baxter gravelly silt loam: (83KY-099-1)												
Bt2-----10 to 25	0.9	7.8	---	2	3	---	3	---	---	---	---	38
Bt3-----25 to 37	0.8	7.9	2	2	3	---	---	---	1	---	---	51
Frederick silt loam: (83KY-099-3)												
Bt1----- 8 to 20	0.9	8.9	2	1	3	---	---	---	---	1	---	51
Bt2-----20 to 37	0.9	9.0	2	1	3	---	---	1	---	1	---	48
Canmer silt loam: (83KY-099-4)												
Bt1-----14 to 24	2.4	7.8	2	3	1	---	---	1	---	1	---	11
Bt2-----24 to 36	2.6	8.4	2	2	2	---	---	1	---	---	1	28

* Relative amounts: 5=dominant, 4=abundant, 3=moderate, 2=small, 1=trace.

TABLE 20.--SAND MINERALOGY OF SELECTED SOILS

(A dash indicates that the mineral was not detected. TR indicates trace amounts of the mineral. The pedon is typical of the soil series in the survey area. For the location of the pedon, see "Soil Series and Their Morphology." Analysis by the Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebraska)

Soil name, report number, horizon, and depth in inches	Percent resistant minerals				Percent weatherable minerals									
	Quartz	Opakes*	Resis- tant aggre- gates	Total resis- tant min- erals	Albite	Andes- ite	Biotite	Calcite	Chlo- rite	Musco- vite	Plagio- clase feld- spar	Potas- ium feld- spar	Seri- cite	Weath- erable aggre- gates
Riney loam: (83KY-099-5)														
Bt1----10 to 28	99	TR	---	99	---	---	---	---	---	---	---	TR	---	---
Bt2----28 to 43	99	TR	1	99	---	---	---	---	---	---	---	---	---	---

* Includes plant opal, tourmaline, and zircon.

TABLE 21.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not determined. The pedons are typical of the soil series in the survey area. For the location of the pedons, see "Soil Series and Their Morphology." Analysis by the Soil Mechanics Laboratory, Soil Conservation Service, Fort Worth, Texas)

Soil name, report number, horizon, and depth in inches	Classifi- cation		Grain-size distribution											Liquid limit	Plas- ticity index	Moisture density		Specific gravity
			Percentage passing sieve--								Percentage smaller than--					Maximum dry density	Optimum moisture	
	AASHTO	Uni- fied	3 in.	2 in.	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm					
														Pct		Lb/cu ft	Pct	
Baxter gravelly silt loam: (83KY-099-1)																		
Bt2----10 to 25	---	CL/ CH	100	---	90	89	88	84	83	81	63	42	39	50	28	99.0	21.5	2.73
Bt4----37 to 60	---	MH	100	---	78	76	75	74	74	72	56	46	35	55	25	91.5	28.5	2.72
Frederick silt loam: (83KY-099-3)																		
Bt1---- 8 to 20	---	CL	100	---	94	92	91	87	85	65	60	54	41	44	22	101.5	21.5	2.70
Bt2----20 to 37	---	CL	---	---	97	95	95	94	93	68	53	46	39	43	21	101.0	21.0	2.71
Bt3, Bt4---37 to 75	---	CL	100	---	96	95	94	93	92	65	52	46	38	40	16	101.0	21.0	2.71
Canmer silt loam: (83KY-099-4)																		
Bt3----36 to 59	---	MH	---	---	---	---	---	100	---	94	65	43	47	66	29	92.0	29.0	2.73
Bt4----59 to 75	---	MH	---	---	---	---	---	100	---	94	82	62	47	65	29	91.0	28.5	2.74
Riney loam: (83KY-099-5)																		
Bt1----10 to 28	---	ML	---	---	---	99	98	94	90	58	43	37	32	42	14	102.0	20.5	2.71
BC-----43 to 75	---	SC- SM	---	---	---	83	67	57	48	17	10	10	8	27	7	120.0	11.5	2.71
Grigsby fine sandy loam: (83KY-099-7)																		
Ap, A-- 0 to 13	---	SM	---	---	---	---	---	100	99	42	33	10	7	---	---	117.0	11.0	2.66
Bw2, Bw3---23 to 44	---	CL	---	---	---	---	---	---	100	74	53	23	21	30	11	111.0	14.5	2.69

TABLE 22.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Allegheny-----	Fine-loamy, mixed, mesic Typic Hapludults
Baxter-----	Fine, mixed, mesic Typic Paleudalfs
Bledsoe-----	Fine, mixed, mesic Typic Hapludalfs
Caneyville-----	Fine, mixed, mesic Typic Hapludalfs
Canmer-----	Clayey, mixed, mesic Typic Paleudults
Crider-----	Fine-silty, mixed, mesic Typic Paleudalfs
Elk-----	Fine-silty, mixed, mesic Ultic Hapludalfs
Frederick-----	Clayey, mixed, mesic Typic Paleudults
Fredonia-----	Fine, mixed, mesic Typic Hapludalfs
Gatton-----	Fine-loamy, mixed, mesic Typic Fragiudalfs
*Grigsby-----	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Hagerstown-----	Fine, mixed, mesic Typic Hapludalfs
Jefferson-----	Fine-loamy, siliceous, mesic Typic Hapludults
Lawrence-----	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lenberg-----	Fine, mixed, mesic Ultic Hapludalfs
Lily-----	Fine-loamy, siliceous, mesic Typic Hapludults
Lindside-----	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Melvin-----	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Newark-----	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson-----	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolichucky-----	Fine-loamy, siliceous, mesic Typic Paleudults
Nolin-----	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell-----	Fine-silty, mixed, mesic Typic Fragiudalfs
Riney-----	Fine-loamy, siliceous, mesic Typic Hapludults
*Sonora-----	Fine-loamy, mixed, mesic Typic Paleudalfs
Tilsit-----	Fine-silty, mixed, mesic Typic Fragiudults
Vertrees-----	Fine, mixed, mesic Typic Paleudalfs
Wallen-----	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Wellston-----	Fine-silty, mixed, mesic Ultic Hapludalfs

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